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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Improved Conditions in Chemical Works

CONSIDERING the character of the materials handled and the difficult and complicated processes in operation, the chemical works of the country require probably as careful regulation as any falling within the scope of the Factory and Workshop Acts. Yet, so well are they now organised and supervised that the dangers have been reduced to a very narrow margin, and accidents are remarkably few. It is satisfactory to learn, from the new report of the Chief Inspector of Factories, that the difficulties met with in the administration of the Chemical Works Regulations have been few and that compliance will probably be secured without serious difficulty. In view of the wide variety of conditions, ranging from the manufacture of pharmaceutical preparations to the large alkali works, the need of variation and occasional exemption seems obvious, yet the practical difficulties are relatively so small that certificates of exemption have only been granted in a few cases, and claims dealing with the manufacture of sulphate of ammonia and with the dehydration of tar in gasworks are at present under consideration. It is further stated that experiments are being made by the Chemical Warfare Committee of the War Office to determine what class of self-contained apparatus can be sanctioned for use in gas-contaminated atmospheres, such as occur in some chemical works.

Although among manufacturers, as among business men generally, there is an almost instinctive dislike of official interference, there can be no doubt that the enforcement of factory regulations has enormously benefited the health and comfort of the workers, improved works efficiency, and ultimately brought equal advantage to both employer and workman. Probably there are many places still where the factory inspector is an unwelcome visitor, but by managements of the more enlightened order the inspector is coming to be regarded as a fellow-worker and adviser in the cause of works efficiency. Perhaps some portion of the change is due to the improved attitude of the inspectors themselves. Many managers of works may still recall some crusty old gentleman, with a modified court-martial manner, who turned up unexpectedly at the works, made himself unpleasant to everybody, and left a hazy sense of terror behind him as to what might result from his visit. The type is now rare, if not extinct, and the modern inspector, while equally faithful in discharging his duties, takes a more liberal and human view of them, and aims more at being an intelligent and helpful adviser than a troublesome policeman. Everyone is the better for the change. Managers are more apt to co-operate in carrying out needful regulations and restrictions, and workmen are less disposed to resent rules primarily intended for their own good.

There is, however, still need for the process of education in these matters. Although improved organisation and mechanical safeguards have excluded a large proportion of accidents that formerly occurred, many of those that remain, we are told, could be prevented by better supervision and organisation of work by employers and their representatives, and by the exercise of greater care on the part of workmen, who often run quite unnecessary risks. Many cases are reported of workmen taking dangerous short cuts, using plant in an unsafe way, and neglecting the safeguards provided, from a false feeling that too strict an avoidance of danger is unmanly. On the other hand, the inspectors' reports show that the regulations are well observed on the whole, and that the standard of compliance was probably higher in 1922 than in previous years. Better attention, it is stated, is now being paid by employers to their statutory duties, and there is a fuller appreciation by workmen of the danger of working with unsafe plant. Several inspectors mention the co-operation they have received from both foremen and workmen, who very frequently draw attention to defects. Several cases have occurred where men have refused to start work until defects have been remedied.

A perusal of the Chief Inspector's interesting report for the past year indicates the duty falling on the

three principal parties—on the inspector, of regarding himself as a friend and adviser rather than as a hostile fault-finder; on the employer, of welcoming every suggestion for improving the conditions of work, as much in his own interests as in any other; and on the workman, of loyally co-operating in observing rules instituted for his own protection.

A New Compound Fertiliser

OUR contemporary *The Gas World* calls attention to a new fertiliser containing nitrogen, phosphates, and potash which is produced in the process of scrubbing gas for the removal of ammonia. The process, it is understood, is the result of experimental work which has been carried out by Mr. E. Lloyd Pease, of Darlington, and the method has now been developed on a small commercial scale. The material obtained would seem to satisfy the demand for a mixed fertiliser and possesses the advantage over the ordinary gasworks product in that, in addition to nitrogen in the form of ammonia, it provides two other necessary plant foods. Besides yielding a compound fertiliser, it appears that the process also offers something in the way of a novelty in processes of ammonia extraction with apparatus of an extremely simple nature. In the ordinary way the ammonia yielded by coal distillation is fixed by utilising sulphuric acid, sulphate of ammonia being the result. In Mr. Pease's process phosphoric acid is substituted for sulphuric acid, the ammonia combining as di- or tri-ammonium phosphate. Only a crude phosphoric acid (which is readily extracted from phosphate rock or superphosphate) is required, and to this is added the desired proportion of sulphate of potash. The solution is then mixed into a finely ground material, such as coke, shale, peat, or clay, so that a damp product is yielded.

Apart from other valuable features possessed by the new fertiliser—such as neutrality or basicity in place of acidity—it is produced by considerably less expenditure of acid than the equivalent mixed fertiliser formed of superphosphate and sulphate of ammonia. As an illustration, 60 tons of acid, when employed to produce ammonium phosphate through phosphoric acid, will produce fertiliser product equivalent to 100 tons used in making superphosphate and sulphate of ammonia separately. Put another way, if, instead of treating a given quantity of phosphate rock with two parts of sulphuric acid to produce superphosphate, three parts are used to produce phosphoric acid, a volume of acid results equal in ammonia fixation—*i.e.*, when taken to the stage of tri-ammonium phosphate—to the total of the sulphuric acid used, besides containing in soluble form the phosphates present in the rock treated and usually represented by superphosphate.

The inventor points out that when peat is used as the absorbent base it supplies the organic element found in the straw of farmyard manures, and it also contains organic nitrogen, which is available for plant use over a prolonged period after the ammonia introduced by gas treatment has been absorbed. The method is certainly not without interest, and those associated with industries where ammonia is yielded as a by-product will, no doubt, look forward to the publication of figures relating to production on a large scale.

Chemistry and Public Health

THE important part which the chemist plays in connection with public health and sanitation was well illustrated in some of the discussions at the Sanitary Congress at Hull last week. In particular, the paper submitted by Mr. Arnold Tankard, city analyst of Hull, drew attention to the problem of pure food and the excessive use of chemical preservatives. It is noteworthy that Mr. Tankard, instead of magnifying the office of the chemist in preserving foods by chemical means, is more disposed to eliminate preservatives altogether and to rely on the qualities of freshness and cleanliness. It seems natural, human nature being what it is, that the dealer who has a rapidly perishable food to sell should rely on a pinch or two of some chemical preservative, which may conceal, if it does not prevent, decomposition, rather than incur the trouble and expense of ensuring continual freshness in his products. Moreover, there appears to be but little supervision of the use of chemical preservatives, and the innocent consumer may be unconsciously absorbing excessive quantities of boric acid or some unknown preservative containing even powdered glass. A committee has now been appointed to inquire into the use of chemical preservatives in foods, and presently we may get some stricter regulation of the practice. In the meantime, Mr. Tankard's own suggestions are practical. He proposes that the addition of any preservative other than sugar and salt to foodstuffs should be immediately prohibited, except in the cases of cream, potted meats, potted fish, and sausages; that the only preservative permitted to be used in the excepted foods be boric acid or its sodium salt borax, the maximum allowable amount to be 0·2 per cent. (14 grains per lb.) expressed in terms of boric acid, and that in all cases the addition be declared by label: that the vendors of preserved cream should be required to sell fresh unpreserved cream at the same shop. Mr. Tankard succeeded in carrying the Sanitary Congress at least a certain distance with him, for a resolution was passed recommending that steps be taken to prohibit the addition of chemical preservatives to food unless the name of the preservative and the percentage in the food are clearly stated.

Lower Sulphate Prices

IN announcing certain price concessions to home users of sulphate of ammonia, in order to encourage them to take early delivery this season, the British Sulphate of Ammonia Federation make it clear that no further reduction in home prices will be made, and that it is their intention to follow their previous policy of working to a schedule of increasing prices during the remainder of the season. Moreover, quantities purchased at the reduced prices must be used for home agricultural purposes only, and, in view of the higher prices which exporters of sulphate are obtaining, a stringent clause on this point is embodied in the contract. The concessions referred to consist of an allowance of 10s. per ton for July–August delivery, reducing the price of neutral quality sulphate, with a content of 25¾ per cent. ammonia, to £14 5s. The Federation have further decided to offer sulphate of ammonia of neutral quality in fine friable condition,

free from lumps, basis 25¾ per cent. ammonia, at £14 10s. for September delivery in lots of four tons and upwards for cash payment. The British consumer is thus being dealt with in a considerate spirit, considering the steadiness of the export demand, and being given a fair opportunity of obtaining supplies before the prices are again put up.

Chemical Plant Manufacture

THE mild protest which the Chairman of the British Chemical Plant Manufacturers made at the annual meeting in reviewing the developments of the year is natural and intelligible. At considerable expense and inconvenience the chemical plant makers have gone in for standardisation in the matter of jacketed pans and filter presses. Their specifications, etc., have not been confined to themselves, and in so far as they are valuable, their value has been placed at the service of the industry. In the circumstances it is natural that they should expect support from the organised chemical manufacturers, whose interests they desire to serve and whose custom they look for. Some support no doubt they have had, but so far, apparently, not to the extent desired. This, however, will come in time, for "service," as the Americans call it, counts in the long run, and those who best serve an industry ultimately get their reward.

On two points the Chairman's remarks will be generally endorsed. He pleaded for greater and greater attention to research in the essential field of the raw materials with which plant manufacturers work. As an instance he mentioned the problem of corrosion, which is especially important in chemical works, and respecting which some small discovery might have very large economic results. On the subject of education, his view is that often the studies of to-day are of a too intensive character. One sympathises with this point of view, and yet it is partly due to the intensive conditions which compel a man to expend his energy on one small section of the field and to leave the rest to be similarly dealt with by other specialists. Nevertheless it is regrettable to see this imagination-destroying process at work, and Mr. Fraser's appeal for a more general vision of the whole realm of science is one with which many will sympathise.

Chemical Goods in Bond

THE Chemical and Dyestuff Traders' Association make out in their memorandum to the Treasury at least a *prima facie* case in the matter of chemical goods imported under Part I of the Safeguarding of Industries Act. The present ruling of the Treasury is that the duties payable under the Act shall be paid by the importer on the landing and clearing of the goods through the Customs. This means, where the imports are large, that a considerable amount of the importer's capital is tied up sometimes for long periods—a point of some importance in the present condition of trade—and that the importer's business is also hampered in other ways pointed out in the memorandum. The suggestion of the Association is that, instead of the duties being payable at once, the goods should be allowed to remain in bond, and the ready cash required by the merchant to finance his business appreciably reduced. The Treasury and the Customs may plead convenience to themselves and profit for the State, usually considered a good plea from the departmental point of view, and also they may argue that the purpose of the Act is to restrict rather than to encourage the importation of foreign products either for home distribution or for re-export. In any case the traders have put up a straight case, and the Treasury may at least be induced to disclose their reasons for the present policy.

Prohibition Effects on Industry

MR. J. ARTHUR REAVELL, who has just returned from the United States after an extensive tour of American engineering and other works, comes back greatly impressed with what American leaders of industry think of prohibition. The heads of all the great concerns, he tells us, unitedly testified to the good effects of prohibition. One marked effect is an appreciable increase of output per head. Investigations go to show that this is by no means the only one, for the workman's family life and habits are said to show as distinct an improvement as the workshop life does in its greater regularity and better work. The interests of industry must in the long run override any temporary social inconvenience and limitation of luxury. One may admit that a banquet on distilled Maryland water and those refreshing fruit drinks and cocktails that Americans excel in may be a less hilarious affair that one on sparkling beverages of another order, but races hold their ground on utility rather than on social gaiety, and whatever we may think of it the American "drought" a year or two hence may be recognised as a great advance in national industrial efficiency.

Points from Our News Pages

Extracts relating to chemical and allied works are published from the Chief Inspector's Report on Factories and Workshops for 1922 (p. 142).

The use of chemical preservatives in food is discussed by Mr. A. R. Tankard in a paper read at the Sanitary Congress (p. 146).

At the annual meeting of the British Chemical Plant Manufacturers' Association the Chairman (Mr. L. M. G. Fraser) reviewed the work of the year and indicated many of the problems to be faced (p. 148).

The Chemical and Dyestuffs Traders' Association publish a Memorandum to the Treasury respecting the bonding of imports under the Safeguarding of Industries Act (p. 150).

Although, according to our London Market Report, there is little serious business about, prices generally tend to grow firmer (p. 157).

According to our Scottish Market Report the heavy chemical market remains quiet, with a tendency to lower prices (p. 160).

The Calendar

Aug. 31 to Sept. 22	Shipping, Engineering and Machinery Exhibition.	Olympia, London.
Sept. 10-13	Institute of Metals: Annual Meeting.	Manchester.
12-19	British Association for the Advancement of Science: Ninety-first Annual Meeting.	Liverpool.

Factories and Workshops: Annual Report for 1922

Notes on Chemical Conditions and Processes

The annual report of the Chief Inspector of Factories and Workshops for 1922 contains much that bears on chemical and allied works. The following extracts are taken from it :—

In the annual report of the Chief Inspector of Factories and Workshops for 1922 (H.M. Stationery Office, 5s.) it is stated that 97,986 accidents (including 843 fatal) were reported during the year, an increase of 5,421 over 1921. The total number of machinery and other "one day" accidents was 29,533, and of non-machinery accidents 68,453, as compared with 27,772 and 64,793 respectively for the previous year. There is no reason to suppose that this increase is attributable to any falling-off in the standard of safety provided; it is rather the result of a change in trade conditions. In the first place the figures for 1921 were greatly affected by the prolonged miners' strike; while, secondly, the improvement in trade during the last months of the year, bringing with it an increase in the number of persons employed and in the number of hours worked, led to a steeper rise in the accident curve during those months.

Chemical Works Regulations

These Regulations (it is stated), which did not come into force until October 1, 1922, supersede the old Special Rules for Chemical Works (made nearly 30 years ago), the Regulations for nitro- and amido- derivatives of benzene, those for chromate and bichromate of potassium or sodium, and embody the Voluntary Code for the Distillation of Tar.

The difficulties met with so far in administration have been few and there is good reason to anticipate that compliance will be secured without serious difficulty. In a code of this character, dealing with a varied class of industry ranging from the manufacture of pharmaceutical preparations on the one hand to large alkali works on the other, the need for power of exemption, to meet the varying conditions under which the processes are carried on, is evident. Certificates of exemption have so far been granted in a few cases only; other claims, dealing more particularly with the manufacture of sulphate of ammonia and with the dehydration of tar in gas works, are at present under consideration.

Experiments are being made by the Chemical Warfare Committee of the War Office to determine what class of self-contained breathing apparatus can be sanctioned for use in gas-contaminated atmospheres, such as occur in some chemical works, and the conditions under which their use can be allowed. Meanwhile no authority to use self-contained breathing apparatus has been sanctioned and occupiers have been advised to rely upon a face mask provided with a tube passing to the outside air.

As the Regulations have been in operation for so short a period, it is not possible to give any detailed account of their observance. The preliminary reports which have been received, more particularly from Mr. Brothers (Warrington) in whose area a large proportion of the more important works are situated, are entirely satisfactory and suggest that in many works a full measure of compliance has already been secured. Certain difficulties of interpretation are foreshadowed, as regards, for instance, whether there is or is not a "liability to explosion" in individual cases such as to necessitate the precautions against naked lights and fires required by Regulation 4, and whether or not dangerous gas or fume is "liable to escape" under particular circumstances, and so necessitate the provision of rescue apparatus required by Regulation 6. With past experience to serve as a guide there should not be serious difficulty in meeting objections of this kind.

The Regulations contain important provisions, making it obligatory, before any person enters any place where there is reason to apprehend the presence of dangerous gas, for a responsible person, specially appointed for the purpose, personally to examine such place, and to certify in writing that it is isolated and sealed from every source of gas or fume, and is free from danger.

Dr. Legge's Report on Industrial Diseases

Dr. T. M. Legge, senior medical inspector, in his report on industrial diseases, states that during the year Dr. E. L. Middleton completed his inquiry into the grinding of metals and cleaning of castings. He made physical examinations of 1,153 workers employed in the grinding, glazing, finishing, etc., of edge tools, textile machinery components, needles and hackle-pins, and in the dressing of castings in the Midlands, Sheffield, Lancashire, and Scotland. His main conclusions are that these industrial processes are associated with the occurrence of three primary respiratory diseases—namely, pulmonary fibrosis, bronchial catarrh, and bronchitis.

Below is the table of notifications under Section 73, 1901, arranged under slightly different headings in some industries from those that have appeared since 1899 :—

Disease and Industries.	Reported Cases.* 1922.	1921.	1912-1914.	1902.
LEAD POISONING	247^{26}	230^{23}	522^{33}	629^{14}
1. Smelting of metals	9^{2}	25^{4}	39^{4}	28
2. Plumbing and soldering	25	14	32^{3}	23^{1}
3. Printing	11	12^{1}	27^{1}	19
4. File cutting	—	—	13	27^{1}
5. Tinning	2	1	11	11
6. Other contact with molten lead	15	7^{1}	23^{1}	24
7. White and red lead	22^{2}	17^{1}	32^{1}	156^{1}
8. Pottery	42^{17}	35^{11}	57^{11}	89^{4}
9. Vitreous enamelling	3	8	8	3^{1}
10. Electric accumulators	32	35	41^{1}	16^{1}
11. Paints and colours	14^{1}	13^{1}	21	46
12. Indiarubber	3	4^{1}	5	2
13. Coachbuilding	15^{1}	20^{1}	71^{4}	63^{1}
14. Shipbuilding	12^{1}	4^{1}	32^{3}	15^{1}
15. Paints used in other industries	23^{2}	12	45^{2}	44^{1}
16. Other industries	19	23^{1}	64^{2}	63^{2}
PHOSPHORUS POISONING	—	—	—	1^{1}
ARSENIC POISONING	—	1	4	4
MERCURIAL POISONING	6^{1}	—	14	8
TOXIC JAUNDICE	3	1^{1}	—	—
EPITHELIOMATOUS ULCERATION	32^{2}	32^{2}	—	—
CHROME ULCERATION	42	29	—	—
ANTHRAX	45^{1}	25^{1}	57^{7}	38^{9}
1. Wool	19^{1}	11^{1}	33^{5}	12^{1}
2. Horsehair	9^{1}	4^{1}	6	10^{2}
3. Handling of hides and skins	16^{1}	8^{1}	14^{1}	11^{5}
4. Other industries	1	2^{1}	4	5

* The principal numbers relate to cases, the small figures to deaths. Fatal cases not reported in previous years are included as both cases and deaths.

Lead Poisoning

A glance at the table shows how in the pottery industry not only is the number of deaths to cases out of all proportion to those in the other industries on the list, but also the difference shown in this respect in the pottery figures themselves since the Workmen's Compensation Act, 1906, came into force, which, rightly, grants compensation to relatives for deaths due to the sequelæ, such as chronic Bright's disease. Another point which has interest is the much higher figure for the symptom of paralysis in men (no doubt due to their much longer duration of employment) than in women.

A signal service in the prevention of lead poisoning was rendered by Mr. C. A. Klein, chemist to the Brimsdown White Lead Company, who worked out a method of incorporating dry lead compounds in rubber and other materials in such a way as entirely to free certain processes from danger, thereby exempting employers from the onerous task, under the India-rubber Regulations, 1922, of providing locally applied exhaust ventilation, periodic medical examination, and other precautions. The method is capable of extension in other directions—*e.g.*, in the glass industry. In this industry red lead, sometimes to the extent of 25 per cent., is mixed with the other ingredients, and every year cases of lead poisoning arise from this cause. Mr. Klein has prepared a fritted lead of low solubility to take the place of the crude red lead.

Dr. Bridge visited the premises following on a case of lead poisoning for collecting finely divided metallic lead. Analysis

of the sample in the Government Laboratory showed that it contained 14 per cent. of soluble lead—a matter of interest, demonstrating that metallic lead, if in a sufficiently fine state of division, is soluble and may cause poisoning. The precautions taken to avoid any similar case in the future consisted in the provision of a facepiece with tube attachment carried to the outside air—an effective method in such a case as this where only one individual was exposed and where the operation only occurred at intervals and was not of long duration.

Dr. Henry, Manchester, has given considerable attention to the occurrence of lead poisoning in the manufacture of paints and colours, the heading of yarn, scrap lead melting, electric accumulators, and the painting of safes. In this connection he has submitted 88 blood films to Dr. Sellers, of the Public Health Laboratory, Manchester, who is continuing his investigation in regard to the significance of punctate basophilia in the blood of lead workers.

Mercury and Phosphorus Poisoning

Four of the six cases of mercurial poisoning were caused by the accidental mixing of mercury with lead borings which were being melted. They all resulted from only one day's work at the process. The two other cases (one fatal) occurred in the making of thermometers. No case of Phosphorus Poisoning was reported. Under the heading Toxic Jaundice are included two cases of poisoning by T.N.T., one a slight case in the melting and filling of shells, and the other severe in the breaking down process, in which T.N.T. is boiled out of shells and accidentally splashed over on to the buckets used near the tanks; from these it was absorbed in handling. The third case was due to arseniuretted hydrogen given off in dissolving zinc residues in vitriol.

Chrome Ulceration

Of this troublesome condition 42 cases were reported—10 in the manufacture and 32 in the use of bichromate of potassium or sodium. The duration of employment per case where use was in question averaged 11 years, and in manufacture 4 years. Dr. Bridge had an interview with the officials of the Dyers' Union, Leicester, to consider the application of the Chrome Dyeing Welfare Order as it affected their members. One of the main objects of the interview, as put forward by the officials, was that they wished to be in a position to explain to their members the use that should be made of the provisions of the Welfare Order. For this reason he considered the interview very valuable, for one of the difficulties of administering the Welfare Orders is that the men fail to take full advantage of the provisions made under them. An attitude such as that shown by this Union marks a very great advance.

Epitheliomatous Ulceration

The production of cancer by specific forms of irritation was a subject somewhat fully discussed at the annual meeting of the British Medical Association in July, and served to show how important are the figures now available from the notification of epitheliomatous ulceration from pitch, tar, mineral oil and paraffin, in their bearing on the experimental work now being carried on by several observers in this and other countries. At this meeting Dr. A. Leitch recounted the first instance of successful reproduction of cancer by arsenic and by crude shale oils containing paraffins. The unexpected occurrence of this condition from lubricating oils was brought out by Dr. Southam and Dr. Wilson, of the Royal Infirmary, Manchester.

Notification of epitheliomatous ulceration has now been required since 1920, and the number of attacks so reported is as follows:—

	1920.	1921.	1922.	Total.
Pitch	32	24^{2}	23^{1}	79^{3}
Tar	10^{1}	8	4^{1}	22^{2}
Paraffin	3	—	5^{1}	8^{1}
Total	45^{1}	32^{2}	32^{3}	109^{6}

Dermatitis

More and more time has to be given by Medical Inspectors to the investigation of complaints of dermatitis, as to which generally in the industries of the country knowledge is wanted. Dr. Bridge sends a brief account of some of his inquiries:—

Celluloid Substitutes.—As these substitutes contain formaldehyde, irritation of the skin produced by them can be readily understood. Some of the cases occurred among men employed polishing, on revolving mops, articles made from a substitute of this nature, wet pumice powder being used as the abrasive material. The rash affected the forearms, and was characterised by a vesicular papular eruption. The works chemist at one factory very kindly undertook to estimate the amount of formaldehyde present in the *debris* from the polishing machines, and this was found to contain 0·015 per cent. of the total weight. Slight erythema of the skin also occurred among female workers engaged in dry polishing similar articles. This affected the neck and face, and, though of a mild character, produced some irritation and was due to the dust given off in the process.

Shellac Varnish.—Two works were visited in connection with inflammation of the skin of the hands and forearms, due to the use of shellac varnish. Where septic infection had not supervened the cases quickly cleared up when removed from the work. In one instance the varnish was examined for the presence of arsenic, with a negative result. Irritation is primarily produced by the effect of the alcohol on the skin, but in one individual was undoubtedly mainly due to the active steps taken to remove the varnish from the hands before washing.

Sugar Dermatitis.—In two large sugar refineries where over 4,000 persons are employed, particulars of 12 cases which had occurred within the last 5 years were obtained. From the history of the cases, the site of the onset of the dermatitis would almost invariably appear to be between the fingers, and the workers interviewed all stated that it commenced as a dry scaly condition, spreading along the inside of the fingers, and then to the back of the hands. It subsequently becomes moist, though rarely assuming the appearance of a true eczema. At a confectionery works, where 1,500 worker were exposed to sugar, 11 cases of slight dermatitis were recorded during the previous year. The conversion of the sugar lodging on the skin into butyric or lactic acid by the sweat has been suggested as the cause of this form of dermatitis. Though it has been difficult to demonstrate any actual injury to the skin by the sugar particles, this action plays some part in the production of the dermatitis. Considering the number of persons employed in industries involving contact with sugar, the incidence of this form of dermatitis is small. Whether injury to the skin or the action of acid on the skin is the primary cause of this form of dermatitis, the frequent removal of the sugar from the skin is the only sure means of preventing its occurrence. Good washing facilities in all works of this character are considered imperative. The recurrence of the dermatitis in certain individuals seems to show that increased sensitiveness may be produced to such an extent that after one attack even the slightest contact will produce a recurrence. So much so is this regarded as possible in one factory that, after two attacks, the affected worker is invariably transferred to work away from sugar.

Dr. Henry investigated cases of dermatitis from teak wood, and found dermatitis in four workers coming in contact with "accelerene" (para-nitrosodimethylaniline), an accelerator used in the vulcanisation of rubber. Other evidence of dermatitis he found from sugar in confectionery works, from the cracking of Brazil nuts, among orange peelers in jam factories, from baking, from lubricating oil, from sesqui-sulphide of phosphorus.

Fumes and Gases

Below is a comparative table of the number of cases of gassing reported as having entailed absence for one day:—

	1914.	1917.	1919.	1921.	1922.
Carbon monoxide	62^{9}	99^{19}	85^{12}	77^{14}	111^{14}
(*a*) Blast furnace	20^{6}	22^{8}	33^{6}	18^{2}	28^{4}
(*b*) Power	21	32^{3}	19^{1}	27^{3}	37^{7}
(*c*) Coal	7^{1}	20	10^{4}	18^{4}	32^{1}
(*d*) Other	14^{3}	25^{4}	23^{1}	14^{5}	14^{2}
Carbon dioxide	3^{1}	1	3^{1}	5^{4}	1
Sulphuretted hydrogen	22^{3}	11^{4}	3	3	12^{3}
Sulphur dioxide	1	2	7	5	7
Chlorine	2	3	9	3	11
Nitrous fumes	9^{2}	62^{5}	5^{2}	—	8
Ammonia	4^{1}	4^{1}	8	9^{1}	8^{1}
Benzol, naphtha, anilin	4^{2}	4^{2}	9^{3}	10	25^{1}
Arseniuretted hydrogen	1^{1}	12^{3}	3	1^{1}	1
Tetrachlorethane	25^{4}	—	—	—	—
Other (ether, acetone, nickel carbonyl), carbon bisulphide)	—	4	3	3	10^{1}

Comparison of one year with another presents difficulties, especially in the case of carbon monoxide, as an escape of gas may affect several persons at the same time and markedly increase the number for one particular year. Of 28 cases, with 4 deaths, due to blast furnace gas, 8 occurred in charging the cupola, 8 (1 fatal) in repairing furnaces and flues, 6 (1 fatal) from cleaning flues without efficient disconnection, 4 from leakage from underground flues, brickwork, etc., and 2 (both fatal) from leakage from valves.

Producer Gas.—Of the 37 cases, with 7 deaths, from producer and suction gas, 12, with 1 death, occurred in connection with the charging, stoking, etc., of the generating plant, and 1 from starting the suction gas engine; 18, with 5 deaths, from the escape from the exhaust pipe into workrooms, in one case affecting 12 persons. Two engineers at a cement works were found dead one snowy morning. With the object of keeping warm, all accessible doors and windows were shut. An investigation revealed slight leakage from the cover of the scrubbler, and one of the test cocks was partially open. Although efficient oxygen apparatus was provided, no worker knew how to use it.

Coal Gas.—Of the 32 cases, with 1 death, 4 (1 fatal) occurred in gas works, the remaining 28 from distribution in workrooms as the result of defective fittings and inadequately ventilated gas stoves. Thus, an escape from the gas rings under the glucose pans in a sweet factory penetrated through the ceiling and affected 13 persons. Again, 7 cases were due probably to escape from a flueless gas radiator in an ill-ventilated workroom.

Sulphuretted Hydrogen.—Seven cases, with 2 deaths (1 a rescuer), occurred in cleaning tar stills or tanks, and 2 in cleaning the oxide of iron purifying chamber.

Chlorine.—Of the 10 cases, 6 occurred from the increasing use of cylinders of chlorine gas in the bleaching of flour. Dr. Bridge, with Mr. McNair, visited several of these plants. Fortunately the makers are alive to the danger and issue instructions when installing them. As in the case of refrigerating plants, as far as practicable they should be outside the workroom. As a general rule they are placed in a small compartment off the main room. Effective ventilation of this compartment is required, and suitable provision must be made in the event of any leak occurring from a cylinder containing the gas for its removal or neutralisation. The men in charge of the plant require special box respirators, and training in their use.

Ammonia.—Seven cases (1 fatal) occurred in refrigerating plants. The same precautions ought to be used in confectionery factories where ammonia is used as are taken in cold storage works. An accident occurred from this gas in a confectionery factory, and 6 women were affected. Fortunately, the workroom was on the ground floor, and although a slight panic occurred, no serious accident resulted. This shows the importance of isolation of refrigerating plants from main workrooms. Here also special respirators, with training in their use, are called for.

Nitro and Amido Derivatives of Benzene.—Of the 19 cases, 11 occurred in the manufacture, 4 in packing the products, 3 from aniline (1 through wearing defective gloves and 2 others from boiling over of the liquid).

Naphtha, Petrol.—Four, with 1 death, were due to the cleaning out of tanks, and the remaining 2 were due to escape of fumes—one occurring to a man erecting machinery over a naphtha tank, when the fan for the extraction of the fumes was not running, and the other from the escape of fumes from the ground while excavating a large petrol tank.

Nickel Carbonyl.—Six cases, with 1 death, were reported, the symptoms being shortness of breath and bronchitis, following on deposition of the nickel in a fine state of division over the immense area of the respiratory surface. The poisoning was due to a leak of nickel carbonyl which escaped through a joint of a blank which had been inserted to isolate a gas filter and volatiliser. The men were employed for about two hours on repairs to the filter, situated a few feet above the volatiliser. Every apparent precaution was taken at the works in question to prevent escape of gas, and no case of any importance had occurred for 19 years.

Carbon Bisulphide.—A serious case of carbon bisulphide poisoning occurred in a factory where a boy of 14 years of age was employed solutioning rubber soles to attach them to shoes. The process was carried on without any exhaust ventilation. The firm were prosecuted and fined £35.

Sulphur Dioxide.—Dr. Bridge made an inquiry during the year into the conditions of the stoves in which sulphur is used for the bleaching of hosiery, following on a request from the Superintending Inspector of the Eastern Division. Considerable discomfort is caused to the men who light the sulphur and who empty the stoves, but there is no doubt a large number of the men become acclimatised to the conditions of work. Some manufacturers have improved the ventilation so that when bleaching is complete the fumes are either blown out of the stove by means of a fan or exhausted through the chimney stack. A conference with the manufacturers is being held in the early part of this year to consider the matter as a whole.

Chemical Factors in Silica Dust

Dr. E. L. Middleton, in dealing with the dust problem in grinding works, states that the physical and chemical form in which silica occurs in dust has an important bearing on its noxious character. The uncombined form of silica as it occurs in natural crystalline quartz and the secondary silica found in quartzite rocks have the same effect, when fractured, in producing the dangerous silica dust, while colloidal forms of silica or an organised form such as occurs in kieselguhr are not so important in this respect. Combined silica in the form of clays, felspar, and silicates generally, are not in the same class with regard to deleterious effects following on inhalation.

Industrial Research

In the report of Mr. Wright (N.E. Division) it is stated that the British Silk Research Association, supported by the various branches of the British Silk Industry and by the Department of Scientific and Industrial Research, after considering the facilities afforded by the various textile centres, decided to place its Research Laboratory at Leeds, which is in the neighbourhood of various seats of the silk industry, although no silk is manufactured in Leeds itself, and by arrangement the University of Leeds has erected a building adjacent to the Textile Department for the sole use of the Research Association during a term of years. This building, which contains a main laboratory, physical room, balance room, private laboratory and Director's office, was completed about the beginning of September, and work is now in progress. Among the topics included in the programme of research are the study of the physical and chemical properties of silk, of the processes of degumming, weighting, and dyeing in spinning, weaving, and finishing. It is intended also that the laboratory shall serve as a bureau of information.

The National Benzole Association, an important central industrial organisation which comprises some 120 firms engaged in by-product coke and gas manufacture, has also decided to seek association with the Leeds University on the lines of the Joint Research Committee of the University and the Institution of Gas Engineers.

Precautions with Centrifuges

In some comments on accidents with centrifuges it is recommended that the following points should be observed in the running of such machines: (1) The steam pressure, as stated by the makers, should not be exceeded. If the boiler pressure is higher than the working pressure for the machine a proper reducing valve should be fitted on the steam supply pipe, with a safety valve between the reducing valve and the machine. (2) The machine shall not be run without the removable basket being in position. (3) The speed should be measured under working conditions when the machine is installed, and from time to time afterwards. The fitting of a speed governing device is a desirable precaution. (4) No alterations should be carried out at the steam nozzles except by the makers, or with their sanction and under their supervision. If any defect is thought to exist it should be reported to the makers at once. (5) It is desirable to avoid the use of cast-iron in the revolving parts of centrifugal machines, as it has a low tensile strength, is liable to be unsound, and is very susceptible to fracture by shocks.

Chemical Extinguishers

In reference to celluloid works it is stated that too much reliance has been placed upon certain types of chemical extinguishers. One of the essentials to combustion of a substance is a supply of oxygen, and one of the properties of cellu-

loid is that, in itself, it supplies this element. For this reason a celluloid fire cannot be extinguished, in the same manner as an ordinary fire, by exclusion of air. Thus the use of carbon-dioxide from chemical extinguishers, though it may decrease the flame, will not stop combustion. A reduction of temperature is necessary and a ready supply of water is an efficient means of securing this. Sprinkler systems have been proved to be excellent extinguishers; failing these, a hose connection or an ample supply of buckets of water close at hand is recommended.

Artificial Daylight

The use of "artificial daylight" lamps, which were exhibited at the Efficiency Exhibition at Olympia in 1920, and have been described in previous reports, appears to be increasing; they are said to be of great value for colour work and work involving matching of colours.

India-rubber Regulations

These new Regulations came into force on May 1, and replace and extend the old Special Rules. Whereas the old Rules applied only to the use of carbon-bisulphide, the present code provides for safeguards in the use of the lead compounds which are incorporated with the rubber, and require the provision of exhaust ventilation to remove dust. They also apply similar provisions requiring the removal of fumes arising not only from carbon-bisulphide, but also from other injurious chemicals. They also require periodical medical examination of workers employed in injurious processes, and the provision for them of mess-room and lavatory accommodation. Good progress has been made in the erection of the necessary ventilating appliances, but it is interesting to find that, as a result of the Regulations, many of the smaller firms have either so reduced the amount of lead compound used as to bring them outside the Regulations, or are buying their lead compound in a plastic form, already mixed with rubber, and so avoid the creation of any dust within their own works. This is a very satisfactory development; it lessens the area of danger, and results in the dry lead compound being mixed with rubber in the larger works and under good conditions.

Mr. J. A. Reavell's American Visit

Mr. J. Arthur Reavell (the Kestner Evaporator and Engineering Co., London) returned on Saturday last by the *Homeric* from the United States, after an extensive tour which included New York, Baltimore, Buffalo, Boston, and one or two centres in Canada. During his stay of five weeks Mr. Reavell had opportunities of studying American industrial conditions, and he has returned much impressed by his experiences. His visit was partly concerned with developments in connection with the Silica Gel process, and we are informed that the Royal Dutch Co. have closed a contract with the Silica Gel Corporation for the use of Silica Gel in all their oil-refining plants. Another purpose of the visit was to investigate standard practice in benzol production in the coke-oven plants of America. In both respects the visit is regarded by Mr. Reavell as having fully justified itself, and he speaks in high terms of American hospitality and friendship. Mr. Reavell met with two slight accidents during his tour—one while playing deck tennis on the *Berengaria* on the outward voyage and the other while motoring at Washington. These, however, did not seriously interfere with his movements. Mr. Reavell has returned much impressed with the effects of Prohibition. He states that the heads of the large concerns he saw all confirmed the view that output per head has materially increased and were strongly against any reversal of the present policy.

The Petroleum Year Book

The Petroleum Year Book for 1923 has just been received from the Petroleum Press, Ltd., 15, Henrietta Street, London, W.C.2. It is a book of some 450 pages of information relating to the oilfields of the world and the application of their products. Various types of oil engines are described, methods of storing oil discussed, and lists given of oil burning ships, oil bunkering stations (a new addition this year), petroleum companies, etc. Analyses are given of crude oils, and particulars of lubricants are included. The book was first published in 1914, and again in 1921, and yearly since that date. It is a useful work of reference to all connected with the petroleum industry. The price is 10s. 6d. net.

Chemistry in Rubber Manufacture

Possibilities of New Processes

Many of the chemical aspects of rubber manufacture were dealt with in a paper read by Mr. Fordyce Jones, Chairman of the Reliance Rubber Co., Ltd., on Wednesday, August 1, at a meeting of the London and Home Counties Ironmongers Assistants' Association in London.

Mr. Fordyce Jones pointed out that technically, rubber was called a colloid, and chemically its study was one of absorbing interest. It was a gum somewhat analagous to resins and waxes, but very different in its properties. It had been said of rubber that it was a substitute for many things, but that there was no substitute for it. From time to time the raw rubber market heard scare rumours of synthetic rubber at ½d. a lb., but to-day synthetic rubber of any value could only be produced at a higher price than that of raw rubber, and even then it was not comparable in quality or of any great value. Manufactured rubber was called upon to withstand all kinds of different conditions; some products were required for high pressure steam, others to resist oil, grease, and even petrol; others were required for stretching and elasticity, or for compression and resilience; some had to be very soft, some very tough, and some hard as ebonite, the best grades of which were nothing but rubber with about 30 per cent. of sulphur vulcanised to a suitable degree of hardness. Different chemicals and fillers had very surprising effects on the rubber, and some had very definite qualities. As an example, some time ago, motor tyres were always white, being made with zinc oxide; now they were largely black, it having been found that the use of carbon black gave better wear and resistance to abrasion.

This operation of vulcanisation, or heating with sulphur, made rubber almost entirely unaffected by change in atmospheric temperature, and also added greatly to its strength and elasticity. There were several methods of this form of vulcanisation. The rubber or compounded article could be formed into shape, packed in a tray full of chalk and cured in an enclosed steam pan; the rubber could also be pressed between the hollow platens of a steam-heated press and cured in this form; it could also be cured by prolonged heating in enclosed dry air and more generally pressed into form in a steel mould, and cured into shape in steam, or in a steam pan.

Recent Promising Developments

Among several other methods of vulcanising, the most revolutionary and promising was that discovered by Mr. S. J. Peachey, the well-known rubber chemist, and those best informed predicted a big future for this process. In recent years the direct use of the rubber latex for manufacture had been attempted. Mr. Kaye had recently patented, and a company had successfully exploited, the use of rubber latex paper in which a small quantity of latex was added to the paper pulp in the beater, giving a better texture, greater tensile strength and improving on tearability and damage caused by folding. He was now successfully working on methods of co-operating the latex with various fillers for the production of a wide range of articles. Dr. Schidrowitz, another well-known chemist, had patented a process, which was being exploited by a manufacturing company, for vulcanising the latex in liquid form and producing manufactured articles directly from it.

Mr. Fordyce Jones himself also had a promising process for the production of rubber goods from gels, those made by the Peachey process being most suitable and desirous. By this method, for the first time, rubber goods could be cast just as metal was cast, but from the cold. No expensive machinery or steam was required, and rubber articles could be turned out in cheap moulds, either made in die-cast aluminium or other suitable material.

With regard to the preservation of rubber goods, it was pointed out that rubber which had been in direct contact with grease or oil should be cleaned immediately with strong soap or soda, and dusted with chalk or talcum powder. If the rubber had come into contact with acids, after washing ammonia or other alkali should be applied and the chalk finally dusted on. The appearance of rubber goods in shops could be improved by the application of a mixture containing one part of glycerin and nine parts of methylated spirit.

The Use of Chemical Preservatives in Foods*

By Arnold Rowsby Tankard, F.I.C.

It has been the custom for many years to preserve foodstuffs by drying, smoking, salting and pickling, and by the addition of sugar. The more modern methods include pasteurisation, sterilisation by heat or other means, refrigeration, and the addition of chemical substances having an antiseptic action to a greater or less degree.

In the main the older methods of preservation cited do not involve the addition of any substances foreign to foodstuffs, for we habitually consume salt, vinegar and sugar with our food, and the process of "smoking" certain foods is frequently resorted to for the sake of the imparted flavour. The addition of chemical preservatives is, however, in quite a different category. Few who have had any considerable experience of food questions from the chemical and dietetic standpoints can be other than unfavourably impressed with the fact that everyone consumes daily a considerable proportion of his intake of food in a chemically preserved form. Foremost among the chemical preservatives used to check bacterial decomposition of perishable foods are boric acid and borax, salicylic acid, sulphites and sometimes formaldehyde, benzoic acid, and fluorides.

It might well be supposed that the addition of chemical substances, which depend for success on their characteristic antiseptic properties, and therefore might be expected to retard the action of the digestive ferments, would not be permitted in foods consumed by man until a searching official inquiry had demonstrated their harmlessness in moderate doses; but actually these more or less active agents may be, and often are, widely used by food purveyors before any investigation as to their action in the body is carried out. Moreover, although in some cases expert advice is sought by manufacturers on the question of preservatives, frequently this is not done, and in either event the control of the preservative as to its incidence and amount generally remains with the non-scientific man, who is unaware of the composition and properties of the preservative itself, and knows nothing of its therapeutic action. Certain manufacturers add to foods from two to ten times as much preservative as others. This state of affairs is not only objectionable from the consumers' point of view, but is highly inimical to the best interests of the careful manufacturer, who indeed regards the present condition of this question as nothing less than scandalous.

Samples of Carelessness

A few years ago I came across a most remarkable meat preservative, which serves to show the gross carelessness frequently associated with the preparation of these substances. A travelling representative offered a well-known firm in Yorkshire a preservative which was specially recommended for meat foods. My analysis showed: potassium meta-bisulphite, about 30 per cent.; anhydrous sodium sulphate, 60 per cent.; a small quantity of calcium sulphate; and *glass* in fine powder varying from 2 to 7¾ per cent. in different samples. Powdered glass is a very unusual constituent, and no explanation was immediately forthcoming. A year later I examined a similar preservative in another town many miles away, and again the objectionable "glass" was present. Inquiries made by the city analyst for Sheffield resulted in his obtaining a copy of the original formula for the preservative. It was directed to be prepared from potassium meta-bisulphite or similar sulphite compound, and *glass-gall*. Here was the explanation! Glass-gall is the scum which rises to the surface of the molten glass in glass-boiling pans, and is skimmed off. It consists chiefly of sodium sulphate, but naturally carries with it on separation a small but varying amount of glass. It was used in this case as a diluent of the strong meta-bisulphite constituent, but one wonders how much unexplained illness has been caused by this glass-containing preservative! With such cases as this in mind, even the most prejudiced critic of the view that the chemical preservation of foods should be discontinued must surely agree that these additions are frequently made in this country by ignorant persons in a careless and haphazard manner; and this is only to be expected when there are few legal restrictions to their use. The statistics show the necessity, when preservatives are permitted, of adequate control of the kind and amount of these foreign ingredients.

Since the available statistics go to prove that the addition of chemical preservatives to foods is mainly under the control of those having little or no knowledge of their properties for good or ill, as judged by the wide variations in the amounts employed in the same foodstuff, it must be acknowledged that there is a strong case for legislative action, and for a new official inquiry into the whole question. Such inquiry should be directed towards the determination of (1) the therapeutic action of chemical preservatives on the human system in health and disease; (2) the necessity or otherwise of adding chemical preservatives to foodstuffs; and (3) the kinds of preservatives and the maximum amounts to be permitted, if found necessary or desirable in specific foodstuffs.

Therapeutic Action of Preservatives

(1) With regard to the first point, there has been much conflicting evidence published on the question of the therapeutic action of these preservatives, although some of the most careful work, (that for instance, of Wiley in America, which has been confirmed by other investigators) shows that in the case of all the popular preservatives—such as boric acid, salicylic acid, formaldehyde, benzoic acid and its sodium salt (and copper sulphate)—a definitely deleterious action on healthy adults can be traced over relatively short periods of ingestion of the preserved food in most cases. Moreover, it is certain that children and invalids are not unaffected by small doses of preservatives taken in foods over a period of time. Idiocyncrasy with regard to boric acid and other drugs is well known, and persons showing such sensitiveness to the action of certain preservatives can rarely under present conditions guard themselves from frequent illness, on account of the fact that, except in the case of cream, no declaration of the presence of a preservative is legally required in foods or drinks.

It is no answer to these considerations to say that only small amounts of preservatives of no therapeutic significance are added to foods—for, in the first place, since there is usually no disclosure, the wholesaler and the retailer may each add a chemical to food after the manufacturer has dosed it before it leaves his premises; secondly, statistics show that the amounts added are by no means always "moderate"; thirdly, some foods contain more than one preservative—a most objectionable feature; and fourthly, certain preservatives possess a decided cumulative action. Worst of all, it cannot be denied that many people on an ordinary diet consume daily in the aggregate, and unknowingly, practically full medicinal doses of a chemical preservative. Medicine may be well enough at the proper time; but most of us, I am sure, strongly object to taking it continuously and unknowingly with our food. In the case of the average consumer in this country at the present time, however, there is often no alternative.

The fact that certain commercial interests are strongly averse to notifying the presence of preservatives by label impresses me with the importance of this requirement. Our admitted ignorance of the basic principles of nutrition makes it necessary that we should point out the risks involved in allowing our foods to be treated with active chemical preservatives, of the effects of which on vitamins, for example, we know nothing. We are slowly learning that the most important quality in food is *freshness*, and to permit the use of preservatives is on this ground alone an unscientific procedure, since we are allowing stale foodstuffs to be kept in a saleable condition for an unnatural length of time.

Freshness and Cleanliness

(2) After over 25 years' experience in food chemistry and bacteriology, and in the examination of foodstuffs for preservatives, I have come to the definite conclusion that the question of the necessity or otherwise of the chemical preservation of

* From a paper read before the Royal Sanitary Institute Congress, Hull, August 3, 1923.

foods is largely, if not entirely, a matter of *freshness and cleanliness*. In my opinion there are very few foods which, when obtained fresh and prepared and handled under proper hygienic conditions, will not keep a reasonable time without undergoing decomposition.

It is safe to say that our ideas in this country with regard to the general question of cleanliness in the food factory and in the shops are somewhat primitive when compared with the methods adopted in the United States of America and elsewhere. Our meat and bread, for example, are handled and exposed in a most objectionable way, and the contamination of food by flies is almost disregarded by most people. If the use of chemical preservatives was definitely discouraged by restrictive action on the part of the Ministry of Health, it would give a great impetus to the movement for greater cleanliness in the manufacture and distribution of food, as has happened in the United States of America; and surely we are entitled to demand that modern cleanly methods of dealing with all foods for human consumption should now be followed to the utmost possible extent. A much more general use of the cool chamber, as employed by retail butchers, is a great desideratum. If these changes were made, the day of chemical preservatives would be over; but as things now are it is only too obvious that to some traders the chemical preservative, so cheap and easy to use, affords a less expensive alternative.

Boric acid and similar antiseptic compounds will, of course, preserve foods which have become bacterially contaminated owing to uncleanly methods of handling and production, and it is here where the danger lies. It has been shown that pathogenic organisms can live and multiply in such foods in spite of the presence of the preservative, although the activities of the purely putrefactive micro-organisms are held in check. Thus the chemical preservation of foods gives no security to the consumer, though it does help the unscrupulous or careless manufacturer to vend an unsatisfactory product. The prevalence of chemical preservatives in foods does not benefit the consumer in any way, but on the contrary may seriously prejudice him in health, not alone on account of the objectionable action of the preservative itself, but by depriving him of fresh foods of more wholesome character.

Limitation of Use of Preservatives

(3) It seems to me that if there are any foods to which it may be desirable, for a limited period, to permit an addition of preservatives, they are cream and certain meat products—such as potted meats, potted fish, and sausages. Cream might be allowed to contain a maximum quantity of boric acid of 0·2 per cent. (14 grains per pound) during the summer months, under the conditions obtaining under the present Milk and Cream Regulations. Certain specified meat products might be similarly dealt with, the presence of the preservative to be declared by label in all cases. The use of preservatives in foods other than those mentioned should, however, be prohibited. The ultimate aim of those desirous of bringing about a very necessary improvement in the cleanliness and general purity of our foodstuffs should be the gradual abolition of chemical preservatives by Regulations.

Recommendations

I am therefore desirous, in conclusion, of putting before you the following propositions:—

(*a*) That the addition of any preservative, other than sugar or salt, to foodstuffs should be immediately prohibited except in the following cases: Cream, potted meats, potted fish, and sausages.

(*b*) That the only preservative permitted to be used in the excepted foods mentioned be boric acid and its sodium salt, borax, the maximum allowable amount to be 0·2 per cent. (14 grains per pound), expressed in terms of boric acid, and in all cases the addition to be declared by label.

(*c*) That the vendors of preserved cream should be required to sell also fresh unpreserved cream at the same shop.

Since writing this paper, a Preservatives' Committee has been appointed by the Ministry of Health, and has already got to work. In the writer's opinion, it is important that it should be constituted a Standing Committee or Court of Reference on this question, and for this purpose should be fully representative of all the interests involved.

New Sulphate of Ammonia Prices

THE British Sulphate of Ammonia Federation, in a circular dated July, state:—

With reference to our Circular 2/24, dated June, 1923, we have decided to offer special inducement to buyers to take early delivery this season, and are therefore prepared to allow a rebate of 10s. per ton on all orders for August delivery which reach us before August 18, 1923, and which are placed in accordance with Circular 2/24. Buyers who have already placed orders in accordance with Circular 2/24 and taken delivery during July will be allowed 10s. per ton, and should claim this allowance from us, not from the individual members of this Federation who have supplied them. Buyers who have already placed orders in accordance with Circular 2/24 for August delivery will also be allowed 10s. per ton, and this sum will be deducted from suppliers' invoices. The effect of the above arrangements will be to reduce the price for July/August delivery to £14 5s. per ton, for neutral quality, basis 25¾ per cent. ammonia. We have further decided to offer to sell sulphate of ammonia for September delivery, 1923, at £14 10s. per ton for neutral quality in fine friable condition, free from lumps, basis 25¾ per cent. ammonia. Delivered to consumer's nearest station or wharf in Great Britain, for prompt cash payment in lots of four tons and upwards. Limited quantities of ordinary quality will be available in some districts, and will be sold at 23s. per ton less than the above price, basis 25¼ per cent. Orders for August delivery received on and after August 18 will be invoiced at September price. No further reduction in home prices will be made, and it is our intention to follow our previous policy of working to a schedule of increasing prices during the remainder of the season. The price for October will be announced later. It is understood that quantities purchased at the prices stated above will be used for home agricultural purposes only, and our contracts will contain the following clause: "Buyers undertake that the sulphate of ammonia delivered under this contract shall be used for home agricultural consumption in the United Kingdom, Channel Islands or Isle of Man, and to request an identical undertaking from any buyers to whom they may offer or sell such sulphate of ammonia: and it is hereby agreed that in respect of every ton of such sulphate of ammonia sold for export or exported to territory other than the countries named above, whether such sale or exportation shall have been made by buyers themselves or by buyers sub-purchasers, or any other sub-purchasers, buyers shall pay to sellers in addition to the purchase price thereof £10 (Ten Pounds) as and for liquidated damages."

New Income Tax Provisions

To the Editor of THE CHEMICAL AGE.

SIR,—The Finance Act, 1923, has now been passed, and will prove of interest to taxpayers now that final effect is given to the much-discussed provisions. The points of general importance are:—(1) Tax is reduced from 5s. to 4s. 6d. (reduced rate 2s. 6d. to 2s. 3d.) for 1923-24. (2) Inhabited House Duty rates are now 9d. on values over £90, 6d. over £60, 3d. on and over £30, and under £30 exempt. (3) Proceedings for recovery of any fine or penalty may now be taken within six years of 1920-21 and following years, and certain penalties on taxpayers and abettors are increased. (4) Repayment may be claimed for three years back of account of over-assessment resulting from error or mistake in the return or statement. (5) The annual value of property may be appealed against in any year where a reduction takes place in the rent or value. (6) The new property valuation may be appealed against until April 5, 1925, where no Notice of Assessment was delivered. (7) The allowances for repairs to property are substantially increased. (8) Additional assessments may now be made for six years from 1920-21 and later years, but for three years only in cases of deceased persons' estates. (9) Claims for general repayment may be made within six years of 1920-21 and subsequent years; in certain specific cases within one year of the end of the assessment year. (10) Public servants resident abroad, if liability as a resident here arises, must suffer tax on emoluments, pensions and annuities.—Yours, etc.,

W. R. FAIRBROTHER.

67-68, Cheapside, London, E.C.2.

British Chemical Plant Manufacturers

Work of the Year Reviewed

THE third annual general meeting of the British Chemical Plant Manufacturers' Association was held at 166, Piccadilly, London, on Wednesday, July 18. There were present Mr. L. M. G. Fraser (W. J. Fraser and Co., Ltd.) in the chair, Mr. E. A. Alliott (Manlove, Alliott and Co., Ltd.), Mr. F. R. Blizzard (T. and C. Clark and Co., Ltd.), Mr. H. Broadbent (Thomas Broadbent and Sons, Ltd.), Mr. J. H. Rawson (The Widnes Foundry Co., Ltd.), Mr. W. A. Sheppard (Joseph Baker, Sons, and Perkins, Ltd.), Mr. E. Cecil Watkins (W. Noill and Son, Ltd.), Mr. J. W. Wright (The Cannon Iron Foundries, Ltd.), with Mr. W. J. U. Woolcock, Mr. A. J. Malacrida, and Mr. G. J. Alderton. An apology for absence was received from Mr. James Robinson (Mather and Platt, Ltd.).

Chairman's Review of the Year

The CHAIRMAN, in moving the adoption of the annual report, said the number of members kept about the same, and the balance sheet showed that the financial position was an increasingly sound one. They started with a balance of £177 7s. 8d. and carried forward to next year a balance of £264 13s. 8d. He had had constantly before his mind during the past year the question, "What can we do to improve the usefulness of our Association?" The Association did not have fortnightly or monthly meetings at which theoretical papers were read and discussed, but being composed of manufacturing engineers, its purpose was the improvement of the relationship of its members to the chemical manufacturers either by propaganda or discussion of any technical or business problems brought forward by its members, and its prosperity was to be judged rather by the effective aid it could give than by the number of meetings held.

An association pre-supposed two things: Energy, and direction of energy. The first must be supplied by the members in general and the second was the work of the committee and its officers, who were ever ready to meet and to direct the discussion on any problem sent in by members into the best channels for solution. Being, therefore, manufacturers rather than purely theoretical investigators, they did not search for phenomena, their duty being to clothe such phenomena when found with their metallurgy and mechanics so that the utmost that that phenomena could give would be gained. Were they as fully equipped as possible, or could they, by making use of the association, still further advance, in the eyes not only of this country but of the world, the prestige of the British chemical plant manufacturers? If they were able to apply the results arrived at by scientific men, if the laboratory experiment of to-day was to be the engineering achievement of to-morrow, they ought to be very much alive to all that was going on in the scientific world. Let them, therefore, keep their vision firmly fixed on present needs but tune their minds to the edge of the beyond.

With this in view he would like to see the members invited on to the Council of Theoretical and Research Societies and Associations, where their engineering knowledge would probably help in the solution of many difficulties from the mechanical science or engineering point of view, and probably rescue from failure many problems that appeared almost insoluble. Such a combination would be of benefit to all branches of science, and as part of such a plan they would receive from the members at intervals reports of progress in their particular fields. The problems that daily came before them dealt with matter in its solid, liquid, or gaseous state, and it was their purpose so to produce their machinery that it could harness and bring matter to the requirements of the chemist. They had all had wide experience in one department or another connected with this problem, whether it be conveying, grinding, separating, absorbing, calcining, dissolving, evaporating, distilling and condensing, or drying. There could be no finality in these matters, and if that Association could be of use in elucidating any difficulties it should be asked for help.

Inter-Association Trading

The results of the suggestion made at the last annual meeting had not been quite so effective as was hoped. That Association was incepted at the call of the chemist, and a great deal of work has been carried out by the committee in standardising various types of plant such as jacketted pans and filter presses. The manufacturers had altered their patterns and incurred great expense for the ultimate advantage of the chemical manufacturers, and they had hoped that their advances would be better appreciated. Further, this information had been published and made available to other manufacturers who had incurred neither the expense nor trouble of the work entailed. They had, therefore, again brought this subject to the notice of the Association of British Chemical Manufacturers. He suggested that where a member could not himself undertake any particular piece of work he should give other members of the Association the opportunity of doing so, and that a private record should be kept of the various manufacturers who had already erected complete plants for the production of certain chemicals. Such information could be used by the Secretary in dealing with inquiries. It was proposed that, as a means of bringing and keeping the names of members of the Association prominently before the principals and buyers of the chemical trade, a calendar should be printed of such an effective and attractive type that it would be worth while for the chemist to put it in a prominent position so as continually to remind him of their names. This suggestion had met with a very good reception by a number of the members and would be duly considered by the Committee.

British Industries Fair, 1923

This was the first occasion on which the Association made a collective exhibit and he hoped that those who joined in it were satisfied with the result; as propaganda he believed it did good. He had an opportunity of speaking with many chemists and managers of some of the largest chemical works in this country, and they all expressed pleasure at seeing the chemical plant manufacturers at the Fair. Although the representatives were comparatively few it was hoped that next time a much larger gathering would be seen. It had not been possible to obtain sufficient support to have a section at the British Empire Exhibition, especially as the Chemical Section was going to have such a large display.

Joint Research Committee

As manufacturers they were, at various times, much concerned over raw materials, whether it be metals or porcelain, and a great deal of work was at present being done all over the world in endeavouring to find a material that would fulfil all the duties of non-corrosion asked for by the chemist and at the same time enable the engineer to form his apparatus. The chemist was constantly requiring vessels that would withstand higher and higher pressures and increasing temperatures, and they as chemical plant manufacturers were earnestly watching both the chemist and the metallurgist seeking to elucidate these problems for them. Many alloys would suit many requirements, but none would answer all demands.

The study of corrosion was one of absorbing interest, and it was not yet possible to formulate with certainty any definite principles on the subject. The absence of such definite knowledge was a source of difficulty to plant manufacturers. Crystallography, heat, oxidation, purity and electricity all played their part in this difficult subject. Iron founders could do a great deal in more technical research as to their mixtures, sands used, temperatures and rates of cooling, with the object of giving a closer grained and stronger metal. In view of the fact that cast iron was composed of crystals and a matrix, it would, perhaps, be worth while making research in this field when they considered how small a defect would form a starting point for corrosion. The matrix, being the softer, was attacked, and the formation of chemical salts started corrosion by electrolytic action. It would, perhaps, be helpful if the Association were represented on the Cast Iron Research Association.

The Joint Research Committee has done a considerable amount of work under the chairmanship of Dr. Seligman. Chromium steel was very thoroughly investigated and a sub-committee had much interesting and useful discussions with Dr. Hatfield, who gave a great deal of his time to them.

and a very great amount of experimental work had been carried out under his care. The manipulation of this metal was difficult owing to its hardening above the critical temperature, and it had then to be annealed before further work could be carried out, with a subsequent tendency to scaling. This material was only non-resistant to certain chemicals, and the scaling made it less so, but work was being carried out in this direction which might lead to satisfactory results.

After numerous tests of small pieces of nickel and small crucibles it was found that the results of chemical action were not consistent, and varied considerably with the composition of the nickel and the after working thereof.

Education

This ever-present and much debated subject was brought before their Committee and an interim report was presented to the A.B.C.M. in which the characteristics and training of a chemical engineer were discussed. The subject was full of difficulties, not only with regard to the drawing up of the curriculum to be followed, but also in persuading the authorities to change their methods so as to correspond with their ideas. He was afraid, if care was not taken, that the real point would be missed under the haze that had been raised round the term "Chemical Engineer," and the Association might well formulate their own suggestions for use at the proper time. He hoped, therefore, that they would have a member on any representative committee that seriously took up the question.

The tendency of the present day was towards too intensive education, whether in mathematics, mechanics, dynamics, etc., and a much broader education would be of far greater use to the great majority of men. The history of science and the lives of great scientific men were means of giving vision which was so necessary to the successful man. Many years ago Galton wrote a book in which he endeavoured to formulate the salient points of a great scientific man, and in order to find these sent out a questionnaire. From the replies received he found that the essential qualifications could be summarised as follows: (1) energy, (2) health, (3) concentration or the steady pursuit of purpose, (4) business habit of mind, (5) independence of views, (6) innate love of science. If education could be modelled to produce this result they would be on sound lines.

Standardisation of Plant

Referring to the Report of the Sub-Committee on Standardisation of Cast Iron Filter Presses, the Chairman said that the specification there set out had been adopted by the British Engineering Standards Association, and called for little comment. He could not do better than endorse the letter sent to Mr. Woolcock by the Secretary of the British Engineering Standards Association in which he concluded:—"The acceptance of the proposals submitted by your Joint Committee without any important alterations is a further tribute to the care and thoroughness with which the work has been carried out by that Committee."

Traffic

In August last the rates were reduced from 100 per cent. to an average of about 75 per cent., plus flat rates, above the pre-war, and in May of this year the percentage was reduced to about 60 per cent. plus the flat rate. Application was at present before the Tribunal for a reduction to 33 per cent. above pre-war.

In regard to the terms and conditions under which general merchandise would be carried, the conditions for company's risk traffic had now been settled, and the most important feature about the conditions was that for the first time in the history of railways the contract would include a definite statement of the carrier's liabilities. Even in those cases where the railways were generally exempt from liability from the Act of God, The King's Enemies, etc., companies had still to show that they used all reasonable care and foresight in dealing with the merchandise.

Forms of Schedules for the new rates had been fixed by the Rates Tribunal, and the traders had been able to secure some concessions in the methods of basing rates which should prove of great advantage to the trading community generally. For instance, to-day if traffic passed over the lines of three railways from private siding to private siding, the railway companies were entitled to charge as for 18 miles, whereas under the new system they would only be able to charge as for 9 miles.

British Empire's Mineral Resources

THE Imperial Mineral Resources Bureau, which has been making an exhaustive study of the mineral resources of the British Empire with a view to their possible development to supply the chief requirements of British industry, has completed its statistics relating to iron and steel, copper, and lead. The bureau's figures show the relation of British production of the foregoing metals to total world production for the years 1919 to 1921 inclusive.

Official reports of the bureau just received by the Bankers' Trust Company from its English Information Service compare British output of the various metals with world production during 1921 as follows:

	1921. British Empire production.	1921. World production.
	(Thousand tons.)	
Iron ore	5,752	73,000
Pig iron	3,957	36,500
Steel ingots and castings	4,719	38,700
Copper ore (in terms of metal)	46	537
Smelter copper	53	580
Lead ore (in terms of metal)	199	869
Smelter lead	136	849

For 1920 the bureau's figures are: Iron ore, British production 14,499,840 tons, world production 122,000,000 tons; copper ore, British production 73,000 tons, world production 972,000 tons; lead ore, British production 108,200 tons, world production 941,000 tons.

The bureau's reports indicate that Canada is the greatest copper ore producing country in the British Empire, with Australia second. In lead ore production Australia was first among British countries in 1921, and India was second, but India was first in 1920. The United Kingdom is by far the greatest producer of iron ore in the British Empire, but the bureau's figures show that iron ore production increased in some British overseas countries, particularly India, during 1921, compared to their output in 1919 and 1920. It is also shown by the bureau's figures that the United States is the leading producer of all of the above ores, with a total output in 1921 of iron ore 29,379,789 tons; copper ore (in terms of metal) 208,121 tons, and lead ore (in terms of metal) 361,808 tons.

Death of Mr. Charles E. Musgrave

IT is with great regret that we announce the death, after a short illness, on August 3, of Mr. Charles E. Musgrave, F.C.I.S., Secretary of the London Chamber of Commerce (Incorporated). Mr. Musgrave, who was in his 63rd year, entered the service of the London Chamber in 1882, having previously been on the staff of *The City Press* and the *Citizen*. He was appointed assistant secretary in 1909, on the retirement of Mr. Kenric B. Murray. Both in connection with and apart from that office, Mr. Musgrave was concerned in many important movements of a national and imperial character. He was Secretary of the British Imperial Council of Commerce, an association of all the Chambers of Commerce in the British Empire, in which capacity he organised the eighth Congress of Empire Chambers of Commerce in London in 1912, and assisted in organising the ninth Congress at Toronto in 1920; he was General Secretary of the Timber Trades Federation of the United Kingdom and of the London Labour Conciliation and Arbitration Board, and Honorary Secretary of the British Roumanian Chamber of Commerce. A fellow of the Chartered Institute of Secretaries, he was elected President of that body for the year 1921–1922. He frequently appeared as a witness before Parliamentary and Departmental Committees and Royal Commissions, and was Joint Author of a book on the Factory and Workshops Act, 1901. He also wrote a history of the London Chamber of Commerce from 1881 to 1914. Amongst other things he was Honorary Secretary of the City of London Branch of the Royal Society of St. George (which he assisted in founding), and later Vice-Chairman of the Branch; a liveryman of the City of London and a member of the Court of the Turners' Company; a Freemason (Authors' Lodge); Chevalier of St. Anne of Russia, conferred upon him by the late Emperor of Russia on the occasion of his visit to Cowes in 1909; and Officer of the Crown of Roumania. Mr. Musgrave's death will be mourned by a wide circle of business and personal friends.

Safeguarding of Industries

Chemical Traders' Memorandum to the Treasury

THE British Chemical and Dyestuffs Traders' Association have forwarded to the Treasury and H.M. Customs a memorandum on the method of payment of duties under the Safeguarding of Industries Act (Part I). They state that importers of goods scheduled under Part I of the Act have to pay the duty of 33⅓ per cent. at the time the goods are landed and cleared at H.M. Customs. This procedure, it is understood, is governed by Section 39 of the Customs Consolidation Act, 1876, whereby H.M. Treasury are given power to decide whether goods liable to import duties shall be allowed to be bonded or not. The Treasury Order in respect of the Safeguarding Act stipulated that the duties should be paid at the time of landing and clearance of the goods at H.M. Customs.

How the Act Affects Traders

During the period this Act has been in force (the memorandum states) it has been found that the present method of payment of duties is, in many ways, having a detrimental effect on the commerce of this country. The following points are submitted in support of this view :—

1. Prior to the introduction of the Safeguarding of Industries Act and the import duties it entails, merchant importers were in the habit of holding as stocks bulk supplies of goods, and were thus enabled to meet both home and overseas demands without delay. The re-exportation aspect was then of very considerable importance, it being estimated that quite half the volume of imports now liable to Key Industry duty were, when previously allowed free import, disposed of by way of re-export sales. Careful and exhaustive inquiry has been made as to what effect the payment of import duties under the Act has had on this important branch of the chemical trade, and it has been found that :—

(*a*) The difficulties and uncertainty of obtaining "drawbacks" of duties paid at the time of importation make it impracticable for merchants to compete in overseas markets. For instance, unless a merchant holding stocks of goods on which duty under this Act has been paid can ascertain definitely and quickly whether he can recover such duty upon re-exportation, he is unable to arrive at his selling price, and is thus prevented from competing for overseas business. It is certain that if he does not allow for a "drawback" his price to the foreigner would not be competitive.

(*b*) On account of this position, the volume of re-exports of goods liable to Key Industry duty has fallen away in a very deplorable manner, and merchants are continually complaining that they have lost and still are losing such business, and they state that it is largely due to the disadvantages arising out of the present method of collection of duties levied under the Act.

(*c*) Some firms, in an endeavour to overcome this barrier to re-export trade, are now holding stocks at Continental ports and meeting demands in that way. This must entail loss of freights to the shipping interests of this country, and loss of employment at the docks, in warehouses, and in various other directions. It has been found that in this way only is it possible and practicable for merchants in this country to hope to compete successfully in overseas markets.

(*d*) Claims for drawbacks usually take a considerable time to settle, and in many instances where the goods in question have, since their importation, changed hands one or more times, it has been found almost impossible to satisfy H.M. Customs as to their identity. While the merchant is attempting to overcome these difficulties the overseas business is lost.

2. As regards sales of dutiable goods in this country, merchants in order to carry on their business as economically as possible and to fulfil their function as distributors, are in the habit of importing in bulk quantities. Such goods are gradually liquidated, and in many instances the duty paid at the time of importation may not be recovered in full for twelve months or even longer. For instance, the importer of dutiable goods to the value of £3,000 has to pay £1,000 as duty at the time of importation, and it is not exceptional for the period mentioned to elapse before the whole of the importation is sold and the duty thus recovered. In this way considerable amounts of capital are locked up, to the detriment of the merchant and trade in general.

Traders' Suggestions

It is submitted that, in the case of re-exports, if merchants were given the opportunity of putting goods liable to Key Industry duty into bonded warehouses at the time of importation, and thus be relieved of the immediate payment of duty and the uncertainty of obtaining drawbacks, the trade of this country in re-exports of chemicals would be materially facilitated, and would undoubtedly increase in volume.

In the case of sales to buyers in this country, duty would only be paid at the time they were taken out of bond for actual delivery. Under this arrangement, comparatively large amounts of capital would be at the importer's disposal, instead of being locked up as is the case under the present conditions.

Consideration has been given, and inquiry made, as to whether there would be objection on the part of warehouse interests to accepting goods scheduled under Part I of the Act, on account of their dangerous character in themselves or when stored with other goods. It appears that as these materials are packed in such a manner as to satisfy shipping lines, who accept them at ordinary rates, and, for the same reason, insurance of such goods is effected at low rates, it is believed that warehouse interests would approve of the suggested system of bonding.

It is therefore suggested that, as the present system of collection of duties under the Act is doing great harm to the commerce of this country, especially in the matter of re-exports, the Order made by H.M. Treasury at present in force should be suitably amended so as to allow dutiable goods to be put into bond.

New Metallurgical Department at Manchester

THE Metallurgical Department of Manchester University is moving into new quarters on September 11, during the visit to the city of the Institute of Metals. Sir George Beilby, who was head of the Fuel Research Board, will open the new department.

The original department was formed in 1906 by Dr. H. C. H. Carpenter, whose intention was to design a course which would give a thorough general training in metallurgy, both ferrous and non-ferrous, in metallography and fuel. Recent changes have added a special course of metallurgy for engineering students and training in dental metallurgy. About sixty papers prepared on various subjects by the staff and students have been published in transactions of societies, the more important dealing with chromium steels, high-speed steels, the measurement of hardness.

The whole department is now to be housed in a building inside the College ; it is being very much altered for its new use, and as soon as it is ready the new reader in colloids will occupy the rooms vacated by the metallurgists. On the ground floor of the new building there will be a chemical laboratory for ordinary metallurgical analysis, a heat treatment laboratory with muffles, and a testing laboratory. This will hold a Brinell hardness-testing machine, a sceleroscope hardness tester, an Avery tensile-testing machine, a Stanton alternating stress-testing machine, a wire bend test machine, and a wire torsion-testing machine.

The foundry will contain assay furnaces with high-temperature muffles on the surface combustion principle, a Fletcher-Russell injector furnace, gas-fired, together with rolls, and a small wire-drawing machine. There is to be a fuel laboratory equipped for the analysis of fuels, calorimetry and viscosity of liquid fuels and their flash-points, a small machinery room and a pyrometer laboratory fitted for the measurement of high temperatures, etc.

On the first floor will be private rooms for the professor and the staff, with private laboratories attached to each, and a lecture room for 50 students, the Cort laboratory—named after the eighteenth-century discoverer of the puddling process for the production of wrought iron, and of the method of production of rolled metals from grooved rolls—which will be for general physical measurement of metals at high temperature, and a metallographic laboratory. On this floor also will be rooms for photo-microscopy, with instruments by Zeiss and Reichert, and two research laboratories. Through the kindness of Dr. Lapworth, the professor of chemistry, the department has recently received a collection of furnace models, and the Forbes collection of metallurgical specimens, which contains many samples of interest in the history of metallurgy.

Problem of the Genesis of Petroleum

By Percy Edwin Spielmann, Ph.D., B.Sc., F.I.C.

The author of these notes is at present engaged on a volume on this subject shortly to be published by Ernest Benn, Ltd.

THE spirit of inquiry, which is the measure of intellectual progress, has long been busy with the origin of petroleum, and has not yet finished with it. Animal, vegetable, and mineral sources have been claimed on evidence ranging from the most worthless to the strongest; and a vast amount of work has been put forward, with an ingenuity of exposition in inverse proportion to the scientific value of the communication.

Agricola, in 1544, sought to co-relate oil, bitumen, and coal; Humboldt, in 1804, formulated a theory of distillation of oil from supplies at extreme depths of the earth. A cosmic origin was suggested by Sokoloff in 1892; and Moissan, in 1902, emphasized the significance of the action of water on carbides in the laboratory.

Theories have also been enunciated of distillation of organic remains from positions deep-seated in the earth; of decomposition of animal and vegetable matter under definite conditions of temperature and pressure and peculiarity of surroundings. Haquet, in 1794, considered Galician oil to have been formed from marine animals. Henkel, in 1725, supposed a mixed animal and vegetable origin.

It is remarkable that, since these long-passed dates, the resources of science have led to so little of direct importance being achieved in the elucidation of the problem. In recent years some of the work that has been done has been remarkable, but even to-day there is not even an approach to finality or agreement. The most that can be said is that the "inorganics" are dying vigorously, and that the "organics" wish to consider the origin of any particular oil on its own merits. The theory that has the greatest probability is that of Engler and Höfer, which may require some relatively small ultimate modification. In fact, evidence is becoming overwhelmingly in favour of an organic origin; but co-ordination of details for definite and final proof has not yet been possible.

The main facts concerning the origin of petroleum that have to be explained are the following:—(*a*) the composition of the crude oil, which varies from a paraffinic to an aromatic and a napthenic character, and also in the proportions of the constituents; (*b*) the frequent presence of nitrogen, sulphur, oxygen and phosphorus; (*c*) the frequent, and perhaps universal, existence of optical activity; (*d*) the frequent association of oil with coal, bitumen and even jet, as well as with brine.

Of the many interesting points of controversy between the "organics" and the "inorganics," that of the existence in past eras of adequate quantities of parent-substance has been one of the most important. The latter group of workers have denied the possibility of there ever having been enough to supply the oil known to exist; but the former have advanced enough evidence to expose the lack of weight of their opponents' attack. The enormous amounts of organic matter now seen to be decomposing under conditions most likely to produce petroleum in the future (if it be truly of organic origin), and the huge geological deposits of animal remains that are occasionally found, are stated to be amply sufficient, and more. These accumulated remains, of enormous thickness, of marine animals may well have resulted from widespread poisoning by gases from volcanic eruptions.

The solution of the problem depends ultimately on work in the laboratory, partly as the complement of field observation, and partly as a substantiation of theory by artificial production of the oil. Such work is proceeding energetically, and of the more recent and significant is that of Kobayashi, in Japan, on pressure distillation of fish oils in presence of acid clay. But how far heat under laboratory conditions is a true substitute for geological time, by merely accelerating the necessary changes in the organic matter, and how far it causes its own specific and unnatural decompositions, does not seem to have been finally settled. The importance that this should be properly understood is obvious.

Another piece of laboratory work of high interest and value is that which is to account for the optical activity of almost all oils, if not every one. The fact that oils can affect polarised light is very strong evidence for an organic origin, and much detailed work has been done to identify cholesterene or its decomposition products. This substance, which has its vegetable analogue in phytosterol, is a characteristic of animal life; and as it is easily destroyed by heat its identification would clarify several obscure questions. If a definite and specific test for phytosterol could also be applied to petroleum, a further step would be won.

A very large amount of admirable work has been done on individual oils, in recording peculiar observations, and in attempts at artificial production of oil, but there appears to have been no concerted action in attacking the problem. However, according to a recent announcement, the University of Strasbourg is starting a Petroleum Institute, and it is to be hoped that its activities will cover such "team work," as up till now—with the exception of Engler and Höfer—geologists, chemists, bacteriologists, biologists, microscopists, have all been working independently of each other. And if there ever was an inquiry that needed united effort this is undoubtedly one.

A Laboratory Catalogue

A COMPREHENSIVE catalogue of chemical laboratory equipment has recently been issued by Baird and Tatlock (London), Ltd., of 14-15, Cross Street, Hatton Garden, London, E.C.1. It is a large volume bound in blue cloth and contains 954 + xv pages printed on a heavy smooth paper. There are eight sections in the volume, conveniently provided with thumb indexes, the whole forming the firm's chemical catalogue, quite apart from similar volumes on Physiological, Biological and Physical equipment. The sections in the chemical volume at present under consideration cover an extraordinary range, and indicate that the firm is prepared to supply anything from the smallest item of laboratory equipment, such as glass rods, to completely fitted laboratories with a wide range of chemicals. The sections deal with (1) Laboratory Fittings (water and gas pipings, benches, etc.); (2) General Equipment (burners, weighing apparatus, furnaces, stills, etc.); (3) General Chemical Apparatus (glass and porcelain apparatus, filter papers, etc.); (4) Physical Chemistry (calorimeters, thermostats, hydrogen ion apparatus, etc.); (5) Inorganic Chemistry (metallurgical and assaying requirements); (6) Organic Chemistry (special apparatus for combustions, gas analysis, specific reactions, etc.); (7) Metereology (barometers, hygrometers, etc.); (8) Chemicals and Standard Solutions (a list suitable for all laboratory requirements). A very useful feature of the catalogue is that each item is denoted by a number, which is a great convenience in ordering articles. This is the first issue of the catalogue since the war, a similar volume having originally been issued in 1914. It is interesting to note that prices are now sufficiently stabilised to permit definite quotations in the large majority of cases, and the new issue will be welcomed by those in charge of laboratories who have had to order their requirements with the aid of a pre-war catalogue supplemented by later lists of prices.

Export Regulations on Sulphate of Ammonia

MR. SHINWELL (House of Commons, August 1), asked the President of the Board of Trade whether he was aware that sulphate of ammonia for export from the Clyde was not being weighed and checked, and that sealed samples were no longer taken; and whether, since this was contrary to custom, he proposed taking action in the matter.

Viscount Wolmer said that the official control of the export of sulphate of ammonia, which was instituted during the War, was now at an end. The export was, accordingly, subject only to the ordinary Customs Regulations, and he had no reason to think that these Regulations were not being observed. Mr. Shinwell appeared to be referring to certain trade arrangements over which the Board of Trade had no control.

Unemployment Returns

THE Ministry of Labour announces that the number of persons on July 30 registered at the employment exchanges in Great Britain as wholly unemployed was 1,195,600. This was 10,700 more than in the preceding week, but 290,278 less than the figure on January 1, 1923. The number working short time and drawing benefit for intervals of unemployment was 66,900 on July 30, compared with 62,094 on July 23, and 56,261 on January 1.

From Week to Week

MR. PERCY GATES, M.P., has been elected Master of the Brewers' Company.

THE DEATH is announced of Professor F. Krafft, professor of chemistry at Heidelberg.

THE University of Cambridge has decided to confer on Dr. Wilder D. Bancroft, professor of chemistry in Cornell University, U.S.A., the degree of Sc.D.

AN EXPLOSION occurred on Wednesday in the electro-chemical works of the Marine Arsenal in Toulon while some men were filling bottles with oxygen. Five men were injured.

MR. WALTER IDRIS JONES, B.Sc., of the University of Wales, has been elected to a Rhondda research studentship for research in organic chemistry at Gonville and Caius College, Cambridge.

MR. W. J. U. WOOLCOCK, general manager of the Association of British Chemical Manufacturers, is at present spending a holiday at Lynton, Devonshire, and is not expected back in London until the end of the month.

IN THE ISSUE of *Nature* for August 4 there appears as a special supplement an authoritative review of the present position of the electron theory, by Sir Oliver Lodge, F.R.S., entitled "The Ether and Electrons."

"THE CHEMIST IN RELATION TO PUBLIC LIFE" is the title of an address which is to be delivered on December 12 before the Manchester Section of the Institute of Chemistry by Mr. F. E. Hamer (THE CHEMICAL AGE).

A FEATURE of the organisation of the American Chemical Exhibition to be held in New York on September 17–22, will be the classification of the industry into groups to a far larger extent than in any previous year.

THE KINGSTON CORONER, at an inquest on a woman who died as a result of taking spirits of salts, said he wished chemists could bring out a less dangerous solution for cleaning purposes, and added that it was a pity spirits of salts could be obtained so easily.

DR. L. H. BAEKELAND, honorary professor of Chemical Engineering in Columbia University, and widely known as the inventor of Velox and Bakelite, has been made an officer of the Legion of Honour (French) and of the Order of the Crown of Belgium.

THE APPLICATION of the activated sludge system for the treatment of the sewage of the City of Glasgow has been the subject of report by Mr. F. W. Harris, F.I.C., City Analyst and Corporation Chemist, and is now under consideration by the Corporation.

ONE HUNDRED AND TWENTY EMPLOYEES of the Limewharf Chemical Works, Falkirk, who struck work on Friday, August 3, have now returned to work pending an inquiry into a wage reduction. The employers originally wanted to reduce the wages of workmen by 2s. and of skilled workmen by 2s. 6d.

AT THE ANNUAL MEETING of the North of England Institute of Mining and Mechanical Engineers, held in Newcastle on Saturday, August 4, Mr. C. C. Leach, presiding, expressed the view that the present pleasing state of affairs was due largely to the work of the honorary secretary, Professor Henry Louis.

THE MINISTER OF HEALTH in the Ontario Government announces the free distribution of insulin to diabetics throughout the Province who are unable to pay for treatment. A supply is now available from the Connaught Laboratories of the University of Toronto on a scale adequate to meet the demand which the Government's decision will create.

THE BOARD OF TRADE has issued the following figures for British trade with Germany for the half-year January to July, 1923: The imports from Germany of chemicals are valued at £848,400, compared with £1,485,400 for the whole of 1922. Corresponding figures for coal-tar dyestuffs are £269,700 and £505,400 respectively. A decided tendency to increase will be noted.

THE UNITED STATES Tariff Commission has fixed September 10 for a public hearing in connection with its investigations into sodium nitrate under the flexible provisions of the tariff. The investigation was ordered by the commission in response to an application filed by the American Nitrogen Products Co., Seattle, for an increase of 50 per cent. in the present rate of 3c. per pound.

FINAL ARRANGEMENTS have been made for the Pan-Pacific Science Congress, which meets in Melbourne from the 13th till the 22nd inst., and in Sydney from the 23rd inst. till Sept. 3. Representative delegations are due to attend from Great Britain, the United States, Canada, New Zealand, Japan, the Philippines, Hawaii, Dutch East Indies, Malaya, Tahiti, Papua, Fiji, and Hong Kong.

"INDUSTRIAL POWER FROM POTATOES" is the title of an article in the *Manchester Guardian Commercial*, reviewing the possibilities of the production of alcohol from potatoes in Ireland. The writer points out that by improving the methods of cultivation, and using potatoes with a high percentage of starch, it would be possible to supply almost the entire liquid fuel needs of Great Britain at an economic figure.

THE BISSET HAWKINS medal, bestowed triennially by the Royal College of Physicians on some duly qualified practitioner who is a British subject and who has, during the preceding ten years, done such work in advancing sanitary science or in promoting public health as in the opinion of the College deserves special recognition, has been awarded to Dr. T. M. Legge, H.M. senior medical inspector of factories and workshops.

THE NEW BUILDING for the Agricultural Department of Leeds University, which was contemplated a few years ago, is about to be erected. The building will contain on the first floor a Biological Department where there will be a general laboratory and a research laboratory, a lecture room, research rooms, an advanced laboratory, and the necessary preparation, sterilising and store rooms. On the second floor will be a large students' laboratory, laboratories for chemical nutrition research, lecture rooms, and rooms for microscopy and other special purposes.

THE ROTHAMSTED EXPERIMENTAL STATION is one of the institutions to which the Empire Cotton Growing Corporation has made a grant of £1,000 for five years, for the development of research work likely to be of importance in relation to problems connected with cotton-growing. The money will be employed in increasing the staff and equipment of the Soil Physics Department, in order that more rapid progress may be made in the study of the fundamental physical properties of soil. The function of the Soil Physics Department at Rothamsted will be to undertake these investigations as part of its study of the fundamental properties of soil.

METHYL ALCOHOL POISONING following inhalation was the verdict returned by a Liverpool jury on Wednesday at an inquest into the death of Robert Lloyd, a labourer, aged 47. Lloyd and two other men were employed at a spirit distillery where a new motor spirit recently put on the market s storedi for distribution in the Liverpool area. The tank in which it was kept was observed to be leaking into a well beneath, and the three men were sent to clear the well out. Some time later Lloyd was found lying on his back, whilst the other two appeared ill. Lloyd was sent to hospital where he died.

A GRANT has recently been offered by the Empire Cotton Growing Corporation to the University of Manchester for a period of five years to promote study and research in mycology and entomology, more particularly the diseases of plants caused by animal and fungus parasites known to be, or likely to be, of importance to cultivators of cotton. It is made a condition of the grant that the University should admit cotton research scholars and assistants on study leave to its laboratories, and it is also asked to deal so far as it can with inquiries from scientific advisers to cotton growers. The work will be carried out in the Departments of Botany and Zoology under Mr. S. Williams and Mr. R. A. Wardle respectively.

A START is to be made shortly in laying down an oil storage plant at Cardiff Docks, which will be one of the largest in the United Kingdom. The plans, which are at present being worked out by engineers, provide for the construction of four huge tanks on a site owned by the Great Western Railway Company close to the entrance to the Queen Alexandra Docks. Two of these tanks will have a ten-thousand-ton capacity, and the other two half that quantity. A capital of £500,000 is involved in the scheme, the leading figures behind which are Mr. L. V. Curry, of New York, Mr. R. W. J. Sutherland, of Cardiff, Lord Glanely, and a number of other prominent South Wales business men.

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Abstracts of Complete Specifications

199,795. Clay, Purification of. W. Feldenheimer, 20, Holborn Viaduct, London, E.C.1, and W. W. Plowman, 83, St. Leonard's Road, East Sheen, Surrey. Application date, March 27, 1922.

In the purification of clay by peptisation of the clay substance with a dilute solution of an alkaline hydrate such as caustic soda, it is found that these peptising agents are not applicable to all clays. The clay suspensions may not be sufficiently stable to separate the non-peptising impurities, and in other cases the difference between the minimum and maximum concentrations of the hydrate necessary to maintain the clay in suspension is too small for commercial working. It is now found that more stable suspensions may be obtained by mixing the clay with a dilute caustic soda solution containing an alkaline earth hydrate such as calcium hydrate. The maximum quantity of calcium hydrate used should not exceed about half the weight of the caustic alkali, *i.e.*, about 0·5 to 1·0 lb. of dissolved calcium hydrate, and about 1 to 2 lb. of caustic soda per ton of clay. The calcium hydrate is therefore sufficiently soluble in water for this purpose. The clay may be prepared under sterile conditions by contact with a hypochlorite solution, such as alkali hypochlorite. This treatment bleaches and purifies the clay when required for the refining of edible oils and for therapeutical purposes. The clay may be mixed with a supernatant liquor obtained by the interaction of an alkaline earth hypochlorite and caustic alkali in excess of two molecular proportions of the alkali to one molecular proportion of the hypochlorite. Alkaline earth hydrates, *e.g.*, lime water, have a flocculating rather than a peptising action upon the clay, but the properties of the solutions of mixed hydrates is not additive. The quantity of caustic alkali necessary for the deflocculation of a given clay may be considerably less when employed in conjunction with the alkaline earth hydrate than when employed alone. To improve the degree of sterilisation of the clay, the contact with the hypochlorite may be longer than that required for the peptisation of clay alone.

200,118. Petroleum, Distillation of. M. Simonoff, 245, Varela Street, Buenos Aires, M. Beninson, 971, Sarmiento Street, Buenos Aires, and F. Gros, 4081, Victoria Street, Buenos Aires. Application date, January 4, 1922.

In distilling petroleum the oil is heated by an electric resistance composed of an alloy such as chrome nickel in the form of grills, ribbons or spirals of wire distributed uniformly throughout the liquid. Reference is directed in pursuance of section 7, sub-section 4 of the Patents and Designs Acts, 1907, 1919, to Specifications Nos. 3210/1914, and 127,987.

200,151. Thymol, Manufacture of. Howards and Sons, Ltd., Uphall Works, Ilford, Essex, and J. W. Blagden, Apple Tree House, Grove Road, South Woodford, London, E.18. Application date, March 10, 1922.

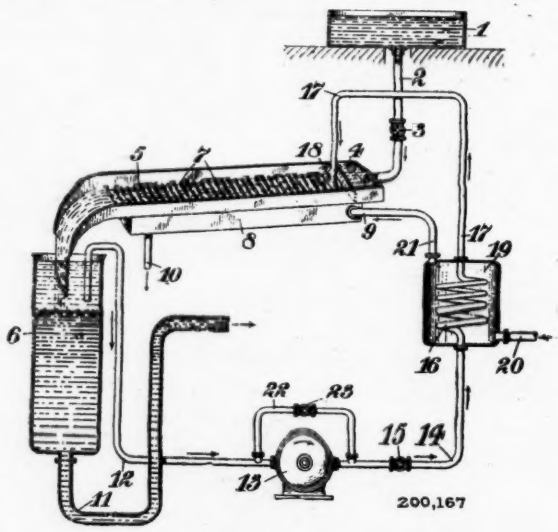
In the process for the production of thymol by the sulphonation of cresol and condensation with isopropyl alcohol in the presence of sulphuric acid with subsequent elimination of the sulphonic group, it has been found that the sulphonation may be eliminated if phosphoric acid is used as the condensing agent. The condensation is conducted at a temperature of 70°–80° C., yielding thymol as the chief product; if the temperature is raised to 150° C., a condensation product of meta-cresol and isopropyl alcohol melting at 114° C. is obtained. In the first instance, thymol is obtained by distilling the condensation product with steam. In the second instance, the oil obtained by distilling with steam is dissolved in alkali and the insoluble portion separated. The solution is then acidified to separate the oil again, which may then be allowed to crystallise. This substance has antiseptic properties.

200,160. Cellulose Derivatives and Fibrous Products, Manufacture of. Plauson's (Parent Co.), Ltd., 17, Waterloo Place, Pall Mall, London, S.W.1. From H. Plauson, 14, Huxter, Hamburg, Germany. Application date, March 31, 1922.

Cellulose esters—*e.g.*, the acetate—are obtained by treating cellulose with a gaseous acylating reagent in conjunction with a gaseous catalyst. The finely divided cellulose material is placed in a porcelain cylinder having a stirring apparatus, and is treated with vapour obtained from acetic anhydride with or without an equal weight of glacial acetic acid. A current of hot air, carbon dioxide or sulphur dioxide, is blown through the acetic anhydride, and then passes over the cellulose. The catalyst consists of 0·5 to 5·0 per cent. of hydrochloric acid gas or sulphur dioxide. After acetylation, the cellulose may be freed from acid by means of steam containing a small quantity of ammonia. The nature of the product depends on the proportion of catalyst—*e.g.*, the product is soluble in acetone if fairly large quantities of the catalyst are used. If the cellulose is employed in the form of fibres or particles having a diameter less than 0·01 mm., the amount of unconverted cellulose may be reduced to 4–6 per cent. If the fibres are of larger diameter or the time of reaction is shorter, a heterogeneous product is obtained having a superficial layer of acetylated cellulose. Mixed esters may be obtained by using a mixture of acetic acid with formic acid or propionic acid. If cotton is acetylated up to ⅓ of its thickness, a product resembling wool is obtained, while if the acetylation extends to ½ to ⅔ of the thickness, a product resembling hair is obtained.

200,167. Chemical Reduction of Organic Compounds. W. G. Adam, N. E. Siderfin, and D. G. Murdoch, of the Gas Light and Coke Co., Tar and Ammonia Products Works, Beckton, London, E.16, and W. L. Galbraith, of The Gas Light and Coke Co., Horseferry Road, Westminster, London, S.W.1. Application date, April 3, 1922.

The process is for reducing water-insoluble organic compounds such as aromatic nitro-derivatives by means of an amalgam of an alkali or like metal. In this process the use of a solvent for the organic compound is not necessary, and



the amalgam is treated with an intimate mixture of an aqueous reagent such as water, containing the organic compound. This mixture may be obtained by mechanical means or with the aid of solid or liquid emulsifying agents. The amalgam may be passed in subdivided form through a mixture of the organic compound and water, or the latter may be caused to flow in an emulsified condition in a thin film or layer over the surface of the amalgam. In the application to aromatic nitro-derivatives, the concentration of the organic compound may be varied so as to obtain products of lower or higher reduction, and the temperature may also be varied for this purpose. If the reduction products are insoluble in alkali, the process may be combined with the electrolytic production of halogen and caustic alkali by the decomposition of an alkali halide in a mercury cathode cell. In this case the reduction mixture is brought into contact with the mercury amalgam flowing from

the cell, so that the process may be made continuous. The reduction product must be such as to be separable from the alkali solution without contamination of the latter, or a substantial loss of alkali.

A tank 1 communicates through a pipe 2 with an overflow 4 at the head of a trough 5 which is slightly inclined downwards. The lower end has a curved discharge into the separating vessel 6. The bottom of the trough is provided with transverse ridges 7, and forms the top of a heating chamber 8 by which its temperature is maintained. The vessel 6 is provided with a discharge pipe 11 communicating with the cathode cell, and a syphon 12 connects the upper part of the vessel 6 to a centrifugal emulsifier 13. A pipe 14 leads to a preheater 16, and thence through a pipe 17 to a discharge device 18 which delivers the emulsion to the trough. The same heating fluid passes around the pre-heater 16 and into the heater 8. In an example, the trough 7 is heated to about 27° C. by means of warm water, and the vessel 6 is filled with mercury to the overflow. A mixture of water with 10 per cent. of *o*-nitranisol is introduced to the upper part of the container, and then passes through the pipe 12, emulsifier 13, pre-heater 16, and pipe 17 to the bed of the trough. An amalgam of mercury from a Castner-Kellner cell is supplied to the container 1 and thence to the trough 5 at a slower rate than that of the emulsion. The mercury collects in the vessel 6 and is returned through the pipe 11 to the cathode chamber. The emulsion is circulated for about 7½ hours, yielding a product containing about 65 per cent. of *o*-anisidine, and 15 per cent. of azo-anisol. A combined emulsifying and reduction vessel is also described containing a rotary agitator within a heating coil. This apparatus may be used for the treatment of *o*-nitranisol and water at a temperature of 75° C. In this case the product consists of about 11 per cent. of *o*-anisidine and over 80 per cent. of a mixture of azo and hydrazoanisol. Nitrobenzene may also be treated in this apparatus yielding about 74 per cent. of hydrazo-benzene, 11 per cent. of azo-benzene and 4 per cent. of aniline. In general an increase of the concentration of the reducible body yields a higher proportion of azo and hydrazo derivatives, and a lower proportion of the amine, while a weak concentration of the reducible body yields the amine as the main reduction product. The nature of the reduction product may also be varied by varying the temperature and the rate at which the emulsified mixture is brought into contact with the amalgam.

200,175. Detergent Compound and Methods of Making the Same. F. H. Guernsey, 7, Bewley Parkway, Lockport, Niagara, N.Y., U.S.A., and The Electric Smelting and Aluminium Co., Lockport, Niagara, N.Y., U.S.A. Application date, April 4, 1922.

The detergent compound is of the kind containing a compound of alumina, silica and alkali, and the object is to obtain a compound which contains a smaller proportion of insoluble matter, and has a melting point sufficiently high to remain solid at summer temperature. These compounds have the general formula: Al_2O_3. $(SiO_2)_x$. $(Na_2O)_{x-1}$. $(H_2O)_y$.

It is found that this compound will always solidify when cooled provided x is greater than 7. An increase in the value of x results in considerable recrease of insoluble amorphous material, and a rise in the melting point. If x is approximately 75, the compound is completely soluble and has a melting point of 126° F. The water-softening property of this detergent may be increased by the addition of alkali metal salts, such as sodium or potassium carbonate, phosphate, or borate. The alumina and silica prevent the causticity of the compound from injuring the material which is treated with it. About 5 per cent. of an emulsifying agent such as oils, fats, etc., in a saponified or sulphonated condition may be added. An additional amount of alkali metal oxide may be added to compensate for the amount consumed in saponification during the process of cleansing. In an example the detergent may comprise the following ingredients: aluminium silicate 75·6 lbs., sodium silicate 1,620 lbs., caustic soda lye 36° Be., 1,375 lbs., soda ash 100 lbs.

200,186. Cellulose Acetates, Manufacture of. J. O. Zdanowich, 36, St. James's Street, London, S.W.1. Application date, April 5, 1922.

Specification No. 139,232 (see The Chemical Age, vol. II, p.360) describes the preparation of cellulose acetate, using weak condensing agents, which may be followed by a strong condensing agent. The viscosity of the solution so made tends to increase on standing, and the object is to avoid this. The solution may be stabilised by the use of a comparatively small quantity of an aqueous solution of an aldehyde, or of tetrachlorethane. The amount of water in this solution should not exceed 40–50 per cent. of the cellulose, so that no substantial hydrolysis takes place. In an example, 150 grams of cellulose is added to 500 cc. of glacial acetic acid and 420 cc. of acetic anhydride, chlorine gas being passed through, and the temperature being maintained at 70°–80° C. When the action is complete, 2 grams of sulphuric acid as a strong condensing agent is added. Stabilisation of this solution may be effected by adding about 100 cc. of commercial formaldehyde solution, and the viscosity of this solution then remains constant, so that the manufacture of threads or films is facilitated. Any other aqueous solution containing an aldehyde may be used as a stabiliser, provided the water content is not sufficient to effect substantial hydrolysis.

200,262. Vegetable, Mineral and Animal Tanning Agents, Manufacture and Application of. W. Moeller, 20, Billhorner-Canalstrasse, Hamburg, Germany. Application date, April 27, 1922.

Some synthetic organic tanning agents, and also vegetable and mineral tanning agents, may have injurious properties due to the presence of organic and mineral acids. These may be neutralised by ordinary alkalies, but this is not satisfactory owing to the presence of the organic salts and the loss of some tanning agent. In the present invention the acid may be neutralised by the addition of an organic base, or a neutral ammonium salt, or free ammonia. Suitable organic bases are primary, secondary or tertiary amines of the aliphatic, heterocyclic, or aromatic series. As examples, the pyridine bases and quinoline bases which occur in coal tar may be used. The content of acid in the tanning agent is first ascertained by titration with alkali, and the necessary quantity of the base is then added. A large number of examples are given of the treatment of tanning agents with neutralising substances, and also the treatment of leather to improve its quality after tanning. Reference is directed in pursuance of Section 7, Sub-section 4, of the Patents and Designs Acts, 1907 and 1919, to Specifications Nos. 131,772, 157,855, and 175,362.

200,376. Electrolysis of Water. L. Casale, 9, Via del Parlamento, Rome. Application date, July 17, 1922.

The electrolytic cell is constructed so that the ascending force of the gas liberated at the electrodes produces currents in the liquid which keep the gases separate without the use

Fig.2

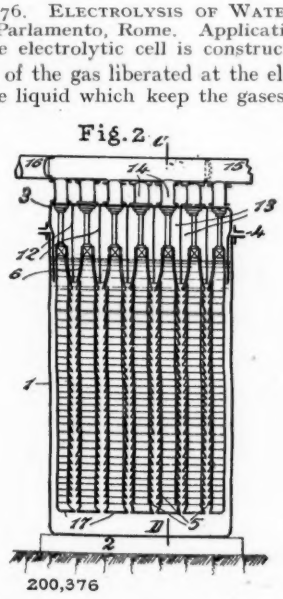
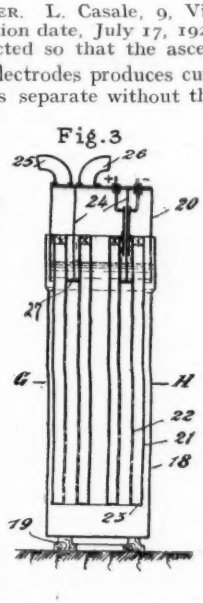


Fig.3



200,376

of a diaphragm. Each electrode consists of a pile of members 5, each being a rectangular metal frame with sloping sides. The frames extend the full length of the cell in a direction at right angles to the plane of the illustration. Each pile terminates in a member 6, which is connected by a vertical rod to an external terminal. Each electrode thus forms a cell with louvres directed inward and upward. The cover is provided with partitions 12, extending downwards to the liquid so as to

form closed compartments 13, each having a delivery pipe 14. The gas collects in the interior of the electrodes and the reduced density of the liquid column thus formed causes an upward current within the electrodes. In a modified electrolytic cell, the cathode is formed of two cylinders 21, 22, the latter having sloping gaps in its wall in the part below the liquid level. The anode is placed within the cathode, and is similar except that the gaps are formed in the outer wall. A cylindrical partition 24 in the upper part is provided with an annular disc 27 to divert ascending gas into the electrodes.

NOTE.—Abstracts of the following specifications, which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention:—179,544 (Soc. d'Etudes Chimiques pour l'Industrie), relating to manufacture of salts of urea, more especially the nitrate, from cyanamides, see Vol. VII, p. 58.

International Specifications not yet Accepted

198,346. RECOVERING OILS. Soc. de Recherches et de Perfectionnements Industriels, 126, Rue de Provence, Paris, and E. B. G. Bascou, 183, Avenue de Neuilly, Neuilly-sur-Seine, France. International Convention date, May 29, 1922.

Coal, lignite, ores, etc., are purified by the Trent or other flotation or flocculating process, and the separated butter-like mass is compressed at 100° C. in filter presses used for making lignite blocks. At a pressure of 1 ton per sq. cm. about 78 per cent. of the oil is recovered, and at a pressure of 1·7 tons about 91 per cent. The residue acts as a binder to the blocks.

198,373. PURIFYING LIQUIDS AND GASES WITH ACTIVATED CARBON. J. N. A. Sauer, 43, Johanna-Verhulststraat, Amsterdam. International Convention date, May 26, 1922.

The substance to be purified is subjected in succession to the action of different kinds of activated carbon. Six different types of carbon are described. (1) Carbon from vegetable material activated by superheated steam or carbon dioxide at 800°—1,200° C., such as "Norit," "Eponit," "Batchite" (from coal), and "Dorsite (from cocoanut shells). (2) Carbon obtained by dry distillation at 200°–2,000° C. of peat, seaweed, sawdust or pine needles, mixed with alkalies or alkaline earths, lime salts or sulphuric acid. These are poor filtering media, and include "Carbrox," "Kelpchar," "Darco," "Delclowyte." (3) Carbon obtained by calcination and then extraction of a solution of cellulose, molasses, etc., in a solvent such as zinc chloride, hydrofluoric acid, or sulphuric acid, or, alternatively, coking the raw material and extracting the residue with selenium oxychloride. These carbons are not suitable for filtering, but are very finely divided and are active absorbing agents. They include "Carboraffin," "Filtchar," "Superfiltchar," "Sugar" or "Suchar," and "Sulphite" carbon. (4) Carbons obtained by the same process as (3) but with the addition of kieselguhr or other porous inorganic material to the solution. Starch and other carbohydrates may also be treated by this process. "Molaschar" is referred to as a carbon of this kind; the filtering and decolorising properties are not good. (5) Carbons obtained by dry distillation at 400°–600° C. of certain animal products, such as bones, blood, fish, etc., yielding products of the class of bone charcoal. These are good absorbing agents but poor filtering media, and include "Noir Epuré," "Noir lavé en pâte," blood charcoal, "Bactanat," "Flandac," "Flaming," "Littoral." (6) Carbons obtained from gases, *e.g.*, "Minchar." These are not good filtering and decolorising materials, but are very finely divided.

The use of these carbons is illustrated with reference to the purification of sugar solutions, glycerine, oils and fats, wine, and the separation of gaseous mixtures. Sulphuretted hydrogen and benzol may be removed from coal gas by the use of two kinds of carbon. For some special purposes such as the removal of iron from glucose solutions, additions such as sodium phosphate may be made to the carbon.

198,645. CHROMIUM SULPHATE. O. Nydegger, Mornimont, Belgium. International Convention date, May 31, 1922.

Chromite when treated with chromic and sulphuric acids yields a solution of chromium and ferric sulphates, and the iron is separated by adding an alkali sulphate, such as ammonium sulphate, and concentrating until the boiling point reaches 150°C. Ferric ammonium sulphate separates out, and the remaining acid is neutralised with lime, leaving normal or basic chromium sulphate.

198,676. CHLORINE DERIVATIVES. Durand and Huguenin Akt.-Ges., Basle, Switzerland. International Convention date, May 31, 1922. Addition to 193,843 (see THE CHEMICAL AGE, Vol. VIII, p. 494).

Specification 193,843 describes the chlorination of aromatic amines as hydrochlorides in an indifferent liquid in the absence of moisture. It is now found that the preliminary conversion into hydrochlorides is not necessary when applied to amines containing negative substituents, including unsubstituted amino-anthraquinones. Examples are given of the chlorination of 3-chlor- or 2 : 5-dichlor-aniline in chlorobenzene solution, and the chlorination of 1-chlor- or 1 : 3-dichlor-2-naphthylamine and α- or β- amino-anthraquinone.

198,681. SOAPS. Hohenloher Seifenfabriken Akt.-Ges., Augsburg, Germany. International Convention date, June 1, 1922.

A soap for use with hard water is mixed with an insoluble metal compound of feebly basic character, such as the oxide or hydroxide of magnesium, calcium, barium, aluminium or zinc. The dissolved salts in the water are thereby precipitated as powders. These additions may be made by adding magnesium sulphate or the like, and sufficient alkali to precipitate the hydroxide.

199,004. SULPHURIC ACID. Aktieselskab Dansk Svovlsyre- and Super Phosphat- Fabrik, 15, Amaliegade, Copenhagen, and Dansk Aktieselskab Siemens Schuckert, 124, Blegdamsveg, Copenhagen. International Convention date, June 9, 1922.

The difference in temperature between the gases when entering and leaving the plant, or the difference between the first and last chambers or towers, is used to control the rate of feed of the oxidising agent. The two temperatures are measured by electrical thermometers, which are arranged in a Wheatstone bridge, so that the difference is measured by the galvanometer. The deflection of the needle makes a contact which controls the valve admitting the oxidising agent. Several variations of the manner of supplying the oxidising agent are described.

Specifications Accepted, with Date of Application

178,852. Devices for bringing liquids and gases into contact. Soc. L'Air Liquide, Soc. Anon. pour l'Etude et l'Exploitation des Procedes G. Claude. April 21, 1921.

179,951. Formic aldehyde, Process of manufacturing. A. Heinemann. May 11, 1922.

180,978. Vulcanisation of rubber or similar materials. Naugatuck Chemical Co. May 28, 1921.

189,107. Aromatic aldehydes, Manufacture of. Barrett Co. November 18, 1921.

190,109. Schists, bituminous materials, brown coal and the like, Vertical distillation retort for the distillation of. Razen, Schaefer and Co., Ges. December 7, 1921.

190,123. Acetyl salicylic acid, Process of manufacture of the calcium salt of. Soc. Chimique des Usines du Rhone. December 6, 1921.

192,994. Cellulose acetate, Process for treating—before dyeing. Soc. Chimique des Usines du Rhone. February 10, 1922. Addition to 150,989.

196,265. Artificial resins. Holzverkohlungs-Industrie Akt.-Ges. April 11, 1922.

200,848. Titanium compounds, Preparation of. W. B. Llewellyn, H. Spence, and P. Spence and Sons, Ltd. January 17, 1922.

200,851. Anthraquinone sulphonic acids, Method of producing. J. Thomas, and Scottish Dyes, Ltd. January 18, 1922.

200,852. Ores and concentrates, Process of treating—to convert them into sulphates. J. B. Read and M. F. Coolbaugh. January 18, 1922.

200,892. Iron, steel, and the like, Process for treating—to produce a protective surface layer thereon. A. Mai. April 19, 1922.

200,902. Cyanides, Process of manufacturing. E. C. R. Marks. (*E. I. du Pont de Nemours and Co.*). April 19, 1922.

200,922. Plastic materials, and apparatus therefor, Manufacture of. *British Cellulose and Chemical Manufacturing Co., Ltd.*, F. T. Small, and W. A. Dickie. April 21, 1922.

200,933. Continuous distillation and dehydration of tar or oils, including cracking of residuals. T. O. Wilton. April 24, 1922. Addition to 127,700.

200,944. Copper and its alloys, Protection of—from oxidation or corrosion. Sir G. A. Muntz. April 29, 1922.

200,956. Reaction chambers, towers, absorption chambers, and the like, Packing or filling material for. C. Schaefer. May 3, 1922.

200,995. Electric furnace. A. Jones. June 13, 1922.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

London, August 9, 1923.

THE holiday season is in full swing and there is little serious business about. Prices generally tend to grow firmer, largely due to the political situation.

Export business is very quiet.

General Chemicals

ACETONE is very scarce, indeed, in all positions. The price is again dearer.

ACID ACETIC has been in better demand; price very firm.

ACID CITRIC is unchanged.

ACID FORMIC is without special feature.

ACID OXALIC is in very poor demand; price unchanged.

BARIUM CHLORIDE has been in much better inquiry, and makers seem to be short for delivery this year.

BLEACHING POWDER is unchanged.

CREAM OF TARTAR is very firm, indeed, and in good inquiry.

FORMALDEHYDE is unobtainable on the spot. No one will buy, pending the Referee's decision on the case brought under the Safeguarding of Industries Act.

LEAD ACETATE is a fair market; price firm.

LITHOPONE is unchanged.

MAGNESIUM CHLORIDE is an active market, and the price seems likely to go higher.

POTASSIUM CARBONATE and POTASSIUM CAUSTIC are unchanged.

POTASSIUM PRUSSIATE is a slow market at recent values.

SODIUM ACETATE is scarce, and the tendency is in sellers' favour.

SODIUM BICHROMATE.—A fair business is passing, the market being in the hands of the local makers.

SODIUM NITRITE is in better demand; price unchanged.

SODIUM PHOSPHATE is rather weaker owing to the poor demand.

SODIUM PRUSSIATE is a slow market, and the article has a drooping tendency.

SODIUM SULPHIDE is in fair request; price unchanged.

Pharmaceutical Chemicals

ACETYL SALICYLIC ACID.—A fair business has been booked price unchanged.

BROMIDES.—Irregular. Many holders decline to sell at current prices, which on a slow market are still unduly influenced by cheap offers from Continental dealers.

COCAINE has advanced.

EUCALYPTUS OIL.—The firm tendency continues.

MERCURIALS have been slow, and holders have of late been inclined to accept slightly lower prices.

PHENACETIN.—Steadier.

SALICYLATES.—A firm demand is reported, especially for soda salicylate. Salol is firm and salicylic acid is unchanged.

VANILLIN.—Unchanged.

Coal Tar Intermediates

Business during the past week has been fairly steady, and the Continent continues to display interest in various products.

ALPHA NAPHTHOL continues in short supply, and the price remains very firm.

ALPHA NAPHTHYLAMINE is steady, with a fair business passing.

ANILINE OIL.—Export buyers are interested, and spot supplies are on the short side.

BETA NAPHTHOL.—Some home inquiries have been received, and small export orders booked.

BETA NAPHTHYLAMINE.—Export inquiries have been received in fair quantities.

DIETHYLANILINE.—Some home inquiries have been received, and the pure product is difficult to obtain.

"G" SALT is featureless.

"H" ACID is in demand.

PARANITRANILINE.—Some export orders have been received.

RESORCIN has been the object of some small inquiry.

Coal Tar Products

Owing to the holidays intervening there is no great volume of business passing in coal-tar products.

90 per cent. BENZOL is fairly plentiful and is worth 1s. 5d. per gallon on rails.

PURE BENZOL is worth 1s. 9d. to 1s. 10d. per gallon on rails.

CREOSOTE OIL is steady and is quoted at 8½d. per gallon on rails in the North, and 9¼d. to 9½d. per gallon in the South.

CRESYLIC ACID is easy at 2s. 1d. per gallon on rails for the Pale quality, 97-99 per cent., while the Dark quality, 95-97 per cent., is quoted at 1s. 9d. to 1s. 10d. per gallon.

SOLVENT NAPHTHA is dull and is nominally worth 1s. 3d. per gallon on rails at works.

HEAVY NAPHTHA is also in poor demand and is quoted at 1s. 5d. to 1s. 6d. per gallon on rails.

NAPHTHALENES.—There has been a very fair amount of buying going on in crystal naphthalene on the part of Continental buyers, and makers of this quality are well sold until the end of the year. This will probably have the effect of steadying the price of crude naphthalenes, which have been weak of late. The prices of the lower qualities of crude are in the region of £6 10s. to £7 per ton, while 74/76 and 76/78 qualities are quoted from £8 10s. to £9 10s. per ton.

PITCH.—Very little business has been transacted recently, and no alteration in prices has been reported.

[*Current Market Prices on following pages.*]

Irish Free State and Chemical Imports

THE British Chemical and Dyestuff Traders' Association are officially informed that, for the time being, the Safeguarding of Industries Act and the Dyestuffs (Import Regulation) Act will continue to be enforced by the Free State Customs. It is, however, the Association states, likely that both these measures will be repealed by the Government of Ireland. No official news can be obtained as to any intention to introduce other and similar legislation in their place, but it is thought that, in the case of the safeguarding of industries, an Act will be brought forward entailing somewhat similar duties. In the case of the Dyestuffs Act, there are rumours that the Free State Government intend to allow the free import of all dyes from all sources. The Free State authorities have promised to advise the Association at the earliest moment of any changes and decisions on these matters.

Commercial Lorries Subsidy

IT is officially announced that with a view to encouraging the use in commerce of a 30-cwt. lorry, fitted with giant pneumatic tyres, the War Office will pay a subsidy of £40 a year to all purchasers of approved vehicles or chassis of British manufacture who enrol under the scheme which entitles the War Department to purchase such vehicles in a national emergency at a price fixed by agreement at the date of enrolment. Enrolment under this scheme will be from year to year up to two years, but in exceptional cases the maximum period may be extended to three years. Specifications of approved vehicles will be supplied to interested manufacturers, and copies of the subsidy agreement may be obtained on application to the Secretary of the War Office, Imperial House (Room 37), Tothill Street, London, S.W. 1.

Current Market Prices

General Chemicals

	Per	£	s.	d.		£	s.	d.
Acetic anhydride, 90–95%	lb.	0	1	4	to	0	1	5
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	127	10	0	to	130	0	0
Acid, Acetic, glacial, 99–100%	ton	71	0	0	to	72	0	0
Acetic, 80% pure	ton	50	0	0	to	51	0	0
Acetic, 40% pure	ton	25	0	0	to	26	0	0
Arsenic, liquid, 2000 s.g.	ton	88	0	0	to	90	0	0
Boric, commercial	ton	50	0	0	to	55	0	0
Carbolic, cryst. 39–40%	lb.	0	1	5	to	0	1	5½
Citric	lb.	0	1	8	to	0	1	8½
Formic, 80%	ton	50	0	0	to	51	0	0
Hydrofluoric	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol	ton	36	0	0	to	38	0	0
Lactic, 60 vol	ton	42	0	0	to	44	0	0
Nitric, 80 Tw	ton	27	0	0	to	28	0	0
Oxalic	lb.	0	0	6½	to	0	0	6¼
Phosphoric, 1.5	ton	35	0	0	to	38	0	0
Pyrogallic, cryst.	lb.	0	5	9	to	0	6	0
Salicylic, technical	lb.	0	1	9	to	0	2	0
Sulphuric, 92–93%	ton	6	0	0	to	7	0	0
Tannic, commercial	lb.	0	2	3	to	0	2	9
Tartaric	lb.	0	1	4	to	0	1	5
Alum, lump	ton	12	10	0	to	13	0	0
Chrome	ton	28	0	0	to	29	0	0
Alumino ferric	ton	7	0	0	to	7	5	0
Aluminium, sulphate, 14–15%	ton	8	10	0	to	9	0	0
Sulphate, 17–18%	ton	10	10	0	to	11	0	0
Ammonia, anhydrous	lb.	0	1	6	to	0	1	8
.880	ton	32	0	0	to	34	0	0
.920	ton	22	0	0	to	24	0	0
Carbonate	ton	32	15	0		—		
Chloride	ton	50	0	0	to	55	0	0
Muriate (galvanisers)	ton	35	0	0	to	37	10	0
Nitrate (pure)	ton	35	0	0	to	40	0	0
Phosphate	ton	65	0	0	to	68	0	0
Sulphocyanide, commercial 90%	lb.	0	1	1	to	0	1	3
Amyl acetate, technical	ton	225	0	0	to	260	0	0
Arsenic, white powdered	ton	73	0	0	to	75	0	0
Barium, carbonate, Witherite	ton	5	0	0	to	6	0	0
Carbonate, Precip.	ton	15	0	0	to	16	0	0
Chlorate	ton	65	0	0	to	70	0	0
Chloride	ton	15	10	0	to	16	0	0
Nitrate	ton	33	0	0	to	35	0	0
Sulphate, blanc fixe, dry	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%	lb.	0	0	11	to	0	1	0
Bleaching powder, 35–37%	ton	10	7	6	to	10	17	6
Borax crystals	ton	27	0	0	to	—		
Calcium acetate, Brown	ton	11	10	0	to	12	0	0
Grey	ton	19	15	0	to	20	0	0
Carbide	ton	16	0	0	to	17	0	0
Chloride	ton	5	15	0	to	6	0	0
Carbon bisulphide	ton	35	0	0	to	40	0	0
Casein technical	ton	100	0	0	to	105	0	0
Cerium oxalate	lb.	0	3	0	to	0	3	6
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	6	0	to	0	6	6
Oxide, black	lb.	0	9	6	to	0	10	0
Copper chloride	lb.	0	1	1	to	0	1	2
Sulphate	ton	27	0	0	to	28	0	0
Cream Tartar, 98–100%	ton	90	0	0	to	92	10	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde, 40% vol.	ton	97	10	0	to	98	0	0
Formusol (Fongalite)	lb.	0	2	1	to	0	2	2
Glauber salts, commercial	ton	4	10	0	to	5	0	0
Glycerin crude	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.	gal	0	2	2	to	0	2	3
Iron perchloride	ton	18	0	0	to	20	0	0
Sulphate (Copperas)	ton	3	10	0	to	4	0	0
Lead acetate, white	ton	43	0	0	to	45	0	0
Carbonate (White Lead)	ton	43	0	0	to	45	0	0
Nitrate	ton	44	10	0	to	45	0	0
Litharge	ton	37	0	0	to	39	0	0
Lithophone, 30%	ton	22	10	0	to	23	0	0
Magnesium chloride	ton	4	5	0	to	4	10	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	6	10	0	to	7	0	0
Sulphate (Druggists')	ton	10	0	0	to	11	0	0
Manganese Borate, commercial	ton	65	0	0	to	75	0	0
Sulphate	ton	45	0	0	to	50	0	0
Methyl acetone	ton	78	0	0	to	80	0	0
Alcohol, 1% acetone	ton	105	0	0	to	110	0	0
Nickel sulphate, single salt	ton	38	0	0	to	39	0	0
Ammonium sulphate, double salt	ton	38	0	0	to	39	0	0

	Per	£	s.	d.		£	s.	d.
Potash, Caustic	ton	35	0	0	to	36	0	0
Potassium bichromate	lb.	0	0	5½	to	0	0	6
Carbonate, 90%	ton	31	0	0	to	32	0	0
Chloride, 80%	ton	9	0	0	to	10	0	0
Chlorate	lb.	0	0	3½	to		—	
Metabisulphite, 50–52%	ton	65	0	0	to	70	0	0
Nitrate, refined	ton	38	0	0	to	40	0	0
Permanganate	lb.	0	0	10	to	0	0	10½
Prussiate, red	lb.	0	3	0	to	0	3	2
Prussiate, yellow	lb.	0	1	3	to	0	1	3½
Sulphate, 90%	ton	10	10	0	to	11	0	0
Salammoniac, firsts	cwt.	3	3	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	25	0	0	to	25	10	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	4½	to	0	0	4¾
Bisulphite, 60–62%	ton	21	0	0	to	23	0	0
Chlorate	lb.	0	0	3	to	0	0	3¼
Caustic, 70%	ton	19	10	0	to	20	0	0
Caustic, 76%	ton	20	10	0	to	21	0	0
Hydrosulphite, powder	lb.	0	1	5	to	0	1	6
Hyposulphite, commercial	ton	10	10	0	to	11	0	0
Nitrite, 96–98%	ton	27	10	0	to	28	0	0
Phosphate, crystal	ton	16	0	0	to	16	10	0
Perborate	lb.	0	1	0	to	0	1	1
Prussiate	lb.	0	0	6¾	to	0	0	7
Sulphide, crystals	ton	8	10	0	to	9	0	0
Sulphide, solid, 60–62 %	ton	14	10	0	to	15	10	0
Sulphite, cryst.	ton	11	10	0	to	12	0	0
Strontium carbonate	ton	50	0	0	to	55	0	0
Nitrate	ton	50	0	0	to	55	0	0
Sulphate, white	ton	6	10	0	to	7	10	0
Sulphur chloride	ton	25	0	0	to	27	10	0
Flowers	ton	11	0	0	to	11	10	0
Roll	ton	9	15	0	to	10	10	0
Tartar emetic	lb.	0	1	2	to	0	1	3
Tin perchloride, 33%	lb.	0	1	1	to	0	1	2
Perchloride, solid	lb.	0	1	3	to	0	1	4
Protochloride (tin crystals)	lb.	0	1	4	to	0	1	5
Zinc chloride 102° Tw.	ton	20	0	0	to	21	0	0
Chloride, solid, 96–98%	ton	25	0	0	to	30	0	0
Oxide, 99%	ton	42	0	0	to	45	0	0
Dust, 90%	ton	50	0	0	to	55	0	0
Sulphate	ton	15	0	0	to	16	0	0

Pharmaceutical Chemicals

Acetyl salicylic acid	lb.	0	3	0	to	0	3	3
Acetanilid	lb.	0	1	6	to	0	1	9
Acid, Gallic, pure	lb.	0	3	0	to	0	3	3
Lactic, 1.21	lb.	0	1	10½	to	0	2	3
Salicylic, B.P.	lb.	0	2	0	to	0	2	3
Tannic, leviss	lb.	0	3	2	to	0	3	4
Amidol	lb.	0	7	9	to	0	8	3
Amidopyrin	lb.	0	12	0	to	0	12	6
Ammon ichthosulphonate	lb	0	1	10	to	0	2	0
Barbitone	lb.	1	0	0	to	1	2	0
Beta naphthol resublimed	lb.	0	1	9	to	0	2	0
Bromide of ammonia	lb.	0	0	7	to	0	0	7½
Potash	lb.	0	0	6	to	0	0	6½
Soda	lb.	0	0	7	to	0	0	7½
Caffeine, pure	lb.	0	10	9	to	0	11	0
Calcium glycerophosphate	lb.	0	5	9	to	0	6	0
Lactate	lb.	0	1	10	to	0	2	0
Calomel	lb.	0	4	6	to	0	4	9
Chloral hydrate	lb.	0	3	10	to	0	4	0
Cocaine alkaloid	oz.	0	17	9	to	0	18	0
Hydrochloride	oz.	0	14	9	to	0	15	3
Corrosive sublimate	lb.	0	4	0	to	0	4	3
Eucalyptus oil, B.P. (70–75% eucalyptol)	lb.	0	1	10½	to	0	2	0
B.P. (75–80% eucalyptol)	lb.	0	1	11½	to	0	2	1
Guaiacol carbonate	lb.	0	8	3	to	0	8	6
Liquid	lb.	0	8	9	to	0	9	3
Pure crystals	lb.	0	9	3	to	0	9	9
Hexamine	lb.	0	3	10	to	0	4	0
Hydroquinone	lb.	0	3	3	to	0	3	6
Lanoline anhydrous	lb.	0	0	7	to	0	0	7½
Lecithin ex ovo	lb.	0	17	6	to	0	19	0
Lithi carbonate	lb.	0	9	6	to	0	10	0
Methyl salicylate	lb.	0	2	3	to	0	2	6
Metol	lb.	0	9	6	to	0	10	6
Milk sugar	cwt.	4	2	6	to	4	5	0
Paraldehyde	lb.	0	1	5	to	0	1	7½
Phenacetin	lb.	0	6	3	to	0	6	6
Phenazone	lb.	0	7	0	to	0	7	3
Phenolphthalein	lb.	0	6	9	to	0	7	0
Potassium sulpho guaiacolate	lb.	0	5	0	to	0	5	3
Quinine sulphate, B.P.	oz.	0	2	3			—	

	Per	£	s.	d.		£	s.	d.
Resorcin, medicinal	lb.	0	5	6	to	0	5	9
Salicylate of soda powder	lb.	0	2	6	to	0	2	9
Crystals	lb.	0	2	8	to	0	2	9
Salol	lb.	0	2	9	to	0	3	0
Soda Benzoate	lb.	0	2	4	to	0	2	6
Sulphonal	lb.	0	14	6	to	0	15	0
Terpene hydrate	lb.	0	1	9	to	0	2	0
Theobromine, pure	lb.	0	10	6	to	0	11	0
Soda salicylate	lb.	0	7	6	to	0	7	9
Vanillin	lb.	1	3	0	to	1	4	0

Coal Tar Intermediates, &c.

Alphanaphthol, crude	lb.	0	2	0	to	0	2	3
Refined	lb.	0	2	6	to	0	2	9
Alphanaphthylamine	lb.	0	1	6	to	0	1	7
Aniline oil, drums extra	lb.	0	0	9	to	0	0	9½
Salts	lb.	0	0	9½	to	0	0	10
Anthracene, 40–50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	2	6	to	0	2	9
Benzidine, base	lb.	0	4	9	to	0	5	0
Sulphate	lb.	0	3	9	to	0	4	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol	lb.	0	1	1	to	0	1	2
Betanaphthylamine, technical	lb.	0	4	0	to	0	4	3
Crocein Acid, 100% basis	lb.	0	3	3	to	0	3	6
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	4	6	to	0	4	9
Dinitrobenzol	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol	lb.	0	0	11	to	0	1	0
Dinitronaphthalene	lb.	0	1	4	to	0	1	5
Dinitrotoluol	lb.	0	1	4	to	0	1	5
Dinitrophenol	lb.	0	1	6	to	0	1	7
Dimethylaniline	lb.	0	2	9	to	0	3	0
Diphenylamine	lb.	0	3	6	to	0	3	9
H-Acid	lb.	0	5	0	to	0	5	3
Metaphenylenediamine	lb.	0	4	0	to	0	4	3
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	5	9	to	0	6	0
Metatoluylenediamine	lb.	0	4	0	to	0	4	3
Monosulphonic Acid (2.7)	lb.	0	8	6	to	0	9	6
Naphthionic acid, crude	lb.	0	2	3	to	0	2	6
Naphthionate of Soda	lb.	0	2	5	to	0	2	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	0	to	0	4	3
Nevill Winther Acid	lb.	0	7	3	to	0	7	9
Nitrobenzol	lb.	0	0	7	to	0	0	8
Nitronaphthalene	lb.	0	0	11½	to	0	1	0
Nitrotoluol	lb.	0	0	8	to	0	0	9
Orthoamidophenol base	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol	lb.	0	1	0	to	0	1	1
Orthotoluidine	lb.	0	0	10	to	0	0	11
Orthonitrotoluol	lb.	0	0	3	to	0	0	4
Para-amidophenol, base	lb.	0	8	6	to	0	9	0
Hydrochlor	lb.	0	7	6	to	0	8	0
Paradichlorbenzol	lb.	0	0	6	to	0	0	7
Paranitraniline	lb.	0	2	7	to	0	2	9
Paranitrophenol	lb.	0	2	3	to	0	2	6
Paranitrotoluol	lb.	0	2	9	to	0	3	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	12	6
Paratoluidine	lb.	0	5	6	to	0	5	9
Phthalic anhydride	lb.	0	2	6	to	0	2	9
Resorcin, technical	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude	lb.	0	0	10	to	0	0	11
Tolidine, base	lb.	0	7	3	to	0	7	9
Mixture	lb.	0	2	6	to	0	2	9

Essential Oils and Synthetics

OWING to the holidays these markets remain very quiet, and there are no price changes of any sort to report.

Essential Oils.		£	s.	d.
Anise	c.i.f. 1/9 spot	0	1	11
Bay		0	12	0
Bergamot		0	12	0
Cajaput		0	3	6
Camphor, white	per cwt.	4	0	0
Brown	"	3	15	0
Cassia	c.i.f. 10/- spot	0	12	0
Cedarwood		0	1	4½
Citronella (Ceylon)	Forward position 3s. 2d. c.i.f.	0	3	6
(Java)	" " 3s. 10d. c.i.f	0	4	2
Clove		0	7	6
Eucalyptus	dearer, very firm	0	1	11
Geranium Bourbon		1	10	0
Lavender		0	12	6
Lavender spike		0	3	0
Lemon		0	3	0
Lemongrass	per oz.	0	0	2½
Lime (distilled)		0	4	0
Orange sweet (Sicilian)		0	13	6
(West Indian)		0	10	6
Palmarosa		1	0	0
Peppermint (American)		0	13	0
Mint (dementholised Japanese). Jan.-Feb. shipments 6s.		0	7	0
Patchouli		1	12	0
Otto of Rose	very firm, per oz.	1	8	0
Rosemary		0	1	8
Sandalwood		1	6	0
Sassafras		0	5	6
Thyme	2/6 to	0	8	0
Synthetics.				
Benzyl acetate		0	3	0
Benzoate		0	3	0
Citral		0	10	0
Coumarine		0	18	6
Heliotropine		0	7	6
Ionone		1	5	0
Linalyl acetate		1	2	6
Methyl salicylate		0	2	6
Musk xylol		0	10	9
Terpeniol		0	3	0

Calcium Arsenate by Electrolysis

IT has been recently reported, by a correspondent of the *Manchester Guardian* in the United States, that a method has been perfected for the manufacture of calcium arsenate in large quantities by electrolysis, and there is prospect in 1924 of sufficient production of this poison to check materially the ravages of the boll weevil. The discovery of the electrolytic method was made by Mr. A. M. Kennedy, an engineer and scientist of the Alabama Power Co. He first conceived the experiment in 1920, and carried it as far as he was able in the plans of the power company with which he was connected. Dr. M. R. Hutchinson, general chairman of the boll weevil control committee, saw that more ample laboratory facilities were needed for success in the experiment, and enlisted the services of the General Electric Co., which placed its large plant and laboratories at the disposal of Mr. Kennedy.

The electric power requirements amount to something less than one kilowatt hour for every pound of calcium arsenate manufactured, and the final tests, which were made this spring, showed that the calcium arsenate produced by electrolysis is identical with that made by the more expensive chemical process. Commercial tests of the electrolytic process are being made this summer, but the process is so new that little can be done towards making calcium arsenate commercially available in quantity in time for this year's cotton crop. Last year the combined producing capacity of thirty manufacturers was only able to supply enough calcium arsenate to treat 200,000 acres of cotton. For properly dusting the cotton area, comprising thirty million acres, with calcium arsenate it is estimated that 700 million pounds of the poison are required.

Aikman's Nitrate Report

IN their fortnightly review Aikman (London) Ltd., state that the arrivals amount to about 50,000 tons and about 80,000 tons are due during the next fortnight. The market has continued extremely quiet, and, like most trades, under the influence of international politics and the absence of any settlement of the European tangle. The only transactions in c.i.f. have been the reported small sales of some near liner parcels of refined quality at about £12 2s. 6d., and good testing ordinary at about £11 15s. Quotations are nominal at about £11 10s. to £12 2s. 6d. per ton c.i.f. for season shipment basis ordinary quality, with a steady undertone. In f.o.b. the Association have sold about 6,000 tons, making their total new season's sales to date about 903,000 tons. The cheapest fixed price remains at 20s. 7d. per metric quintal. Two further increases in price of German synthetic nitrogen products have been announced during the fortnight, the price of nitrate of soda having been raised from M62,900 to M84,300 and again to M154,200; sulphate of ammonia from M52,400 to M84,300 to M128,100; and cyanamide from M46,800 to M75,200 to M114,100, all per unit of nitrogen per 100 kilos. Outside of Germany these prices are, of course, purely nominal, as it has been quite impossible to keep pace with the enormous depreciation in the mark, and any attempt to compare a sterling equivalent would be valueless. The rectified stocks in Chili at June 30 are advised as 1,023,000 tons, against the estimated figure of 1,010,000 tons, thus showing a surplus over the advised production of 13,000 tons.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, August 9, 1923.

THE Scottish heavy chemical market continues quiet, and there is nothing of importance to record. Prices for some materials are inclined to be lower on account of the small demand.

Industrial Chemicals

ACID ACETIC.—Glacial, 98/100%, £60 to £62 per ton; 80% pure, £50 to £51 per ton; 80% technical, £47 to £48 per ton, c.i.f. U.K. ports, duty free. Spot lots of this material are rather difficult to obtain at present.

ACID BORACIC.—Crystals or granulated, £50 per ton; powdered, £52 per ton, carriage paid U.K. stations, minimum ton lots.

ACID CARBOLIC (Ice Crystals).—Now quoted 1s. 2d. per lb. delivered.

ACID FORMIC 80%.—Still available at £50 per ton, ex wharf, spot delivery.

ACID HYDROCHLORIC.—Maker's price unchanged. 6s. 6d. per carboy, ex works.

ACID NITRIC 80°.—£24 per ton, ex station, full truck loads.

ACID OXALIC.—Still on offer at 6d. per lb., ex store, but this price could probably be shaded somewhat.

ACID SULPHURIC.—144°, £3 15s. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality, £1 per ton extra.

ACID TARTARIC.—Unchanged at about 1s. 2½d. per lb., less 5%, ex store.

ALUM, LUMP POTASH.—Now quoted £11 2s. 6d. per ton, ex store.

ALUM, CHROME.—Offered at £22 to £23 per ton, according to quality, f.o.b. U.K. ports.

AMMONIA, ANHYDROUS.—Price remains unchanged at 1s. 5d. per lb., ex station.

AMMONIA CARBONATE.—Lump, 4d. per lb.; ground, 4½d. per lb. delivered.

AMMONIA LIQUID 880°.—Unchanged at about 3½d. per lb., ex station, containers extra.

AMMONIA MURIATE.—Grey galvanisers, quality remains unchanged at about £31 to £32 per ton. Fine white crystals quoted £24 10s. per ton, ex wharf, early delivery.

AMMONIA SULPHATE.—25¼%, £13 2s. per ton; 25¾%, neutral quality, £14 5s. per ton, ex works, prompt delivery.

ARSENIC (White Powdered).—Price for spot lots remains unchanged at about £76 10s. per ton, ex wharf. Slightly lower prices quoted for forward delivery.

BARIUM CHLORIDE 98/100%.—Spot lots offered at £15 per ton, ex store.

BARYTES.—Finest white English, £5 5s. per ton, ex works.

BLEACHING POWDER.—£11 7s. 6d. per ton, ex station, spot delivery. Contracts, 20s. per ton less.

BORAX.—Granulated, £26 10s. per ton; crystal, £27 per ton; powdered, £28 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English make unchanged at £5 12s. 6d. per ton, ex quay or station. Continental material about £4 per ton, c.i.f. U.K.

COPPERAS, GREEN.—About £2 2s. 6d. per ton, f.o.b. U.K. port.

FORMALDEHYDE 40%.—Spot lots very difficult to obtain, quoted about £95 to £97 per ton, ex wharf. Offered for early shipment from Continent at about £88 per ton, ex wharf.

GLAUBER SALTS.—Fine white crystals quoted £3 15s. per ton, ex store.

LEAD, RED.—English makers reduce price to £40 per ton, carriage paid U.K. stations. Continental material about £35 10s. per ton, ex store.

LEAD, WHITE.—Offered from Continent at £36 per ton, c.i.f. U.K. ports.

LEAD, ACETATE.—Spot material scarce. Offered from Continent at £40 per ton, c.i.f. U.K. Prompt shipment.

MAGNESITE, GROUND CALCINED.—English burnt material, £8 5s. per ton, ex station. Finest Continental about £7 5s. per ton, c.i.f. U.K. ports.

MAGNESIUM CHLORIDE.—Continental material unchanged at 32s. 6d. per ton, c.i.f. U.K. ports. Spot lots £2 12s. 6d. per ton, ex store.

MAGNESIUM SULPHATE (Epsom Salts).—Commercial quality, £7 per ton; B.P. quality, £8 5s. per ton, ex station. Continental commercial crystals quoted £4 per ton, ex store.

POTASH, CAUSTIC.—88/92% offered at £29 15s. per ton, c.i.f. U.K. ports. Spot lots about £33 per ton, ex store.

POTASSIUM BICHROMATE.—Unchanged at 5¾d. per lb., delivered.

POTASSIUM CARBONATE.—96/98% offered at £28 10s. per ton, c.i.f., U.K. Spot lots about £32 10s. per ton, ex store. 90/92% offered at £27 per ton, c.i.f. U.K. Spot lots about £28 5s. per ton, ex store.

POTASSIUM CHLORATE.—Unchanged at about 3d. per lb., ex store.

POTASSIUM NITRATE (Saltpetre).—Nominally £32 per ton, ex store.

POTASSIUM PERMANGANATE.—B.P. crystals inclined to be higher at about 10¾d. per lb., delivered.

POTASSIUM PRUSSIATE (Yellow).—In little demand, now offered at about 1s. 2½d. per lb., ex store.

SODA CAUSTIC.—76/77%, £21 7s. 6d. per ton; 70/72%, £19 17s. 6d. per ton; 60/62%, broken, £21 2s. 6d. per ton; 98/99%, powdered, £24 15s. per ton. All ex station, spot delivery.

SODIUM ACETATE.—Some small parcels on offer at about £25 10s. per ton, ex store.

SODIUM BICARBONATE.—Refined re-crystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM BICHROMATE.—Unchanged at 4½d. per lb. delivered.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station; Alkali 58%, £8 10s. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—Continental commercial crystals now offered at £7 15s. per ton, c.i.f. U.K.; spot lots, about £9 10s. per ton, ex store; Pea crystals, £15 per ton, ex store.

SODIUM NITRATE.—Refined 96/98%, about £13 7s. 6d. per ton, f.o.r. or f.o.b. U.K. port.

SODIUM NITRITE.—100%, £26 to £28 per ton, according to quantity.

SODIUM PRUSSIATE.—Yellow, now quoted at about 6¾d. per lb., ex store.

SODIUM SULPHATE (Saltcake).—Unchanged at about £4 per ton, ex station, for home consumption. Higher prices for export.

SODIUM SULPHIDE (60/62% Solid).—Continental material unchanged at about £12 10s. per ton, c.i.f. U.K. Broken quality, £1 per ton more.

SULPHUR.—Flowers, £10 per ton; roll, £9 per ton; rock, £9 per ton; ground, £8 per ton. Prices nominal.

TIN (Crystals).—Unchanged at 1s. 4d. per lb.

ZINC CHLORIDE.—English material about £25 per ton. Continental material about £23 per ton, c.i.f. U.K. ports.

ZINC SULPHATE.—Spot lots of Continental material on offer at £11 5s. per ton, ex store.

NOTE.—The above prices are for bulk business, and are not to be taken as applicable to small parcels.

Coal Tar Intermediates and Wood Distillation Products

ANTHRANILIC ACID.—Export inquiry. Price quoted, 8s. lb., 100% basis, f.o.b. U.K. port.

BI NITROTOLUOL.—Export inquiry. Price quoted, 1s. 3¼d. lb., f.o.b.

BENZIDINE SULPHATE.—Home inquiry. Price quoted, 6s. 3d. lb., 100% basis.

BETA OXYNAPHTHOIC ACID.—Small home inquiries. Price quoted, 10s. lb. delivered.

BENZYL CHLORIDE.—Export inquiry. Price quoted, 1s. 10½d lb., f.o.b.

META NITRANILINE.—Small home inquiry. Price quoted, 5s. 9d. lb. delivered.

META PHENYLENEDIAMINE.—Small home inquiry. Price quoted, 5s. 3d. lb., 100% basis, carriage paid.

ORTHO TOLUIDINE.—Export inquiry. Price quoted, 11d. per lb., f.o.b., drums included.

TOLIDINE BASE.—Supplies are offered at 7s. lb., 100% basis, carriage paid.

Lime in the Glue & Gelatin Industry

By Robert H. Bogue

To understand properly the function of lime, it is necessary to point out briefly the several steps in glue and gelatin manufacture. Several types of raw stock are used, which include hide pieces and trimmings from the tanner or the packer; fleshings, which consist of the under layer of the hides and are made up of loosely packed fibres of skin substance, fat cells, and thin muscles attached to the skin; sinews or tendons and connective tissue; ossein, which is the organic portion of bones left behind when the mineral matter is dissolved out with acids; and bones. All of these, with the exception of untreated bones, are conveniently grouped together as hide stock. Since bones do not receive a lime treatment, they will be omitted from the discussion.

The hide stock is first washed to remove dirt and salt or other preserving material that may have been added, and shredded to bring a greater surface exposure to the reagents employed later. This material is then allowed to stand in vats with a suspension of lime (water-slaked) in water.

After about two weeks the stock is forked out and a fresh suspension of lime in water is added. After two or three such treatments the stock will have attained a plump, uniformly swollen condition, and it is then removed and washed, first with water and subsequently with a dilute acid solution to neutralise the excess of lime. The neutralised stock is placed in a large, open tank, with water and steam admitted below a false bottom until the mixture has attained a temperature of 80° C. or higher. This operation, known as the boiling process, brings about an extraction of the gelatine. The liquor is run off after a few hours, and the boiling repeated a number of times with fresh lots of water. The liquors may then be filtered or clarified, and, being too thin to gel well, are concentrated *in vacuo* and allowed to form a jelly, after which they are dried and ground as desired.

Changes Brought About by the Lime

The most obvious changes that have been induced by the liming operation are the greatly increased volume and the loosening of the hair. The hide pieces have increased to several times their original cross section, and have taken on a firm, rigid appearance. If the hair has not actually fallen off during the lime treatment, it will be found to be held so loosely that a gentle rubbing with the fingers will suffice to remove it.

Perhaps less obvious, but of more importance, are the chemical changes involved. If raw hide pieces were heated with water, solution would be effected very slowly unless a temperature above 100° C. (under pressure) were used. But gelatin, the constituent of glue which gives it the power to form a jelly and upon which adhesiveness seems to depend, is a heat-sensitive substance, and when exposed to high temperatures rapidly undergoes a decomposition, breaking up into constituents which have very little or no value as jelly producers or adhesives. As a result of the lime treatment, however, the hide pieces are enabled to pass into solution by only a moderate heat treatment with water, and the valuable properties of the gelatin are preserved.

Just how the lime functions to bring about this result is not yet altogether clear, but it seems that the alkaline solution induces a loosening and separation of the fibres in the hide. When these are packed tightly, as in untreated skin, they present a limited surface exposure, but the distension produced by the lime offers a greater surface exposure and consequently permits a greater rapidity of solution.

Alkali Concentration

This plumping action appears to be due to a particular concentration of hydroxyl ions or alkali. If portions of a neutral hide are immersed in water containing increasing amounts of alkali or of acid, the hide swells more as larger amounts of alkali or acid are added (there is at first a slight decrease in volume on adding acid) until a certain maximum of swelling is attained, and if still more alkali or acid is added beyond this point, the swelling becomes less and solution takes place. The alkalinity of a saturated solution of lime is very close to that alkalinity at which maximum swelling occurs.

But if only a saturated solution of lime in water is added and the alkalinity of the solution is tested at regular intervals after introducing the hide pieces, it very rapidly becomes less alkaline, and is soon almost neutral. This would also be the case with any other alkaline or acid substance, and is due to the ability of the hide to absorb or react with hydroxyl or hydrogen ions, respectively. By using a suspension of the lime in water this difficulty is overcome, for a suspension is merely a saturated solution plus an excess of the undissolved solid. As rapidly as the hydroxyl ions are removed by the hide, just so rapidly will the undissolved lime pass into solution. By this means the alkalinity of the mixture is automatically held constant. It is this property of a nearly foolproof and automatically controlled alkalinity that makes lime better than most other reagents for this service.

Solvent Action of Lime

Besides collagen, which is converted into gelatin by heating in water, glue stock contains several other proteins that have no value whatsoever in glue. Elastin is found in the connective tissue, mucin is found in cartilage, keratin is contained in hair, and albumins are always present. If these substances were allowed to be cooked with the stock, the product would be weakened and would also give a glue that was turbid, muddy, or opaque. These proteins, especially the albumin and mucin, are soluble in alkaline solutions, and so are dissolved out of the stock by the lime. Acids would not effect such solution. Here again the lime is particularly well adapted for the purpose, as solutions of stronger alkalinity would dissolve also increasing amounts of the collagen and solutions of weaker alkalinity would not be effective in dissolving even the albumins or mucins.

As the albumins and elastin are attacked by the lime the roots of the hair become loosened, for they are embedded directly in the layer of elastin below the epidermis. The hair, having no longer any support, falls out or is easily rubbed off. Some of the fat of the stock is also acted upon by the lime, forming insoluble lime soaps that should be removed in the washing process if a clear product is desired.

Germicidal Action

Lime itself is a very good germicide for most microbiological organisms. There are some forms of bacteria that thrive in lime solutions, and high counts have been obtained of these, but the putrefactive organisms are almost entirely killed or inhibited. In general, it is quite unnecessary to add other preservatives during the liming process.

Selection of the Lime

It is important to use care in the selection of the lime for hide swelling, for it has been found that dolomitic limes which contain large amounts of magnesia are decidedly inferior to the high calcium limes. For some reason that is not entirely clear, the magnesia tends to offset the normal swelling induced by the lime. In practice it is usually most satisfactory to procure a high-grade quicklime and slake it at the plant just prior to use.

The iron oxide content of the lime should likewise be low, as otherwise the colour imparted by it to the finished glue or gelatin may be objectionable, and bleaching may then be necessary.—*Industrial and Engineering Chemistry.*

Company News

UNITED TURKEY RED CO.—The directors have decided to pay forthwith all arrears of dividend on the preference shares to June last.

LINOLEUM MANUFACTUFING CO.—A dividend of 5s. per share, free of tax, is announced, payable on September 11. A similar dividend was paid a year ago.

BROKEN HILL PROPRIETARY CO., LTD.—According to a cablegram from Melbourne, there was a net loss for the year ending May 31 last of £106,086, after deducting £155,304 for depreciation, and £131,277 for debenture interest.

BENN BROTHERS, LTD.—The profit and loss account and balance sheet for the year ended June 30, 1923, show that the company not only maintains its strength but has further improved its position. A sum of £7,565 has been added during the year to the capital account by the continuance of the practice of allotting shares to members of the staff. The directors have felt that, although this money is not at the moment needed, the policy of welcoming as proprietors those who are actually working in the business is too beneficial to abandon. The abnormal level of war-time printing charges is still maintained, and has caused an appreciable shrinkage in the profits derived from the company's trade papers and periodicals. The Books Department, to which optimistic reference was made in last year's report, has more than justified the hopes then expressed, and indeed the maintenance of the company's profits is due to its development. The directors have thought it wise, for convenience of organisation, to create a subsidiary company under the name of Ernest Benn, Ltd., thus dividing the business into two distinct parts—periodicals and books. The revenues for subscriptions and advertisements from all the company's publications continue at the satisfactory level of recent years and in some cases show considerable further expansion, thus proving the high esteem in which the company's productions are held by the trading community as a whole. The directors record with much regret the death of Mr. E. P. Haslam, who joined the Board on the purchase of the *Gas World* by the company, and took an active part in the management until his retirement owing to ill-health in 1920. The net profit for the year, as shown by the accounts, amounts to £25,436, to which should be added the balance brought forward from last year of £11,068, making a total sum available of £36,504. A sum of £10,000 has been added to General Reserve (bringing this account up to £22,375), leaving a net amount for appropriation of £26,504, out of which the directors recommend that a divideno of 17½ per cent. per annum be paid, less income tax, at 4s. 10½d. in the £, leaving a balance of £10,134 to be carried forward. The twenty-seventh annual meeting was held yesterday (Friday) at 8, Bouverie Street, London.

Dyestuff Licences in July

THE following statement relating to applications for licences under the Dyestuffs (Import Regulation) Act, 1920, made during July, has been furnished to the Board of Trade by the Dyestuffs Advisory Licensing Committee. The total number of applications received during the month was 371, of which 264 were from merchants and dealers. To these should be added the 24 cases outstanding on July 1, making a total for the month of 395. These were dealt with as follows: Granted, 246 (of which 227 were dealt with within 7 days of receipt). Referred to British makers of similar products, 70 (of which 66 were dealt with within 7 days of receipt). Referred to Reparation supplies available, 50 (all dealt with within 2 days of receipt). Outstanding on July 31, 29. Of the total of 395 applications received, 336 or 85 per cent. were dealt with within 4 days of receipt.

Research on Oxygen Absorbents

RESEARCH has begun at the Pittsburgh Experiment Station of the American Bureau of Mines on the preparations used to absorb oxygen for explosive purposes. Tests are to be made of every kind of finely divided carbon to determine their relative retentivity. Particular attention is to be given the various types of carbon black.

The Isotopes of Copper

DR. F. W. ASTON, Cavendish Laboratory, Cambridge, in a letter to *Nature* (August 4) points out that the number of elements of which the isotopic nature has been determined is now large enough to give considerable weight to statistical relations. Among elements of odd atomic number two definite empirical rules stand out. The first is that none of them consists of more than two isotopes. This has no exception so far. The second is that the more abundant of the two constituents, or both, will be of odd atomic weight. The only exception to this is the element nitrogen; moreover, the only even isotopes at all are the weaker constituents of lithium and boron. That both of these rules should be violated by copper having the three isotopes 62, 64, 66, announced recently by Professor Dempster, seemed therefore excessively improbable.

Dr. Aston has now been able to obtain the mass-spectrum of copper by employing cuprous chloride in the accelerated anode ray method used with the mass spectrograph. The lines are faint, but their evidence is conclusive since they appear at the expected positions 63 and 65 and have the intensity ratio, about 2.5 to 1, predicted from the chemical atomic weight 63.57. The position of the lines could be determined with great accuracy by comparison with the line 56 due to iron derived from the anode container. No deviation from the whole number rule was observed. With regard to Professor Dempster's results, it is very suggestive that the intensity and grouping of the lines he ascribes to copper agree exactly with those of the strong isotopes of zinc. Dr. Aston thinks it possible that they are due to the presence of traces of that element either in the copper or more probably, together with the rubidium he mentions, in the furnace material.

Affairs of Parker, Ward and Co., Ltd.

A MEETING of the creditors of Parker, Ward and Co., Ltd., manufacturing chemists, Windsor House, Victoria Street, London, and Somerset Road, Teddington, was held on Wednesday in London. The chair was occupied by Sir H. J. de Courcy Moore, who acted as liquidator in the voluntary liquidation of the company. The liabilities amounted to £1,670, while the net assets were £69. The company was registered in October, 1922, in order to acquire the right of a certain process in connection with the manufacture of sulphur for medicinal purposes. The company carried on business from the date of its incorporation down to July 17th last, but the sales in that period were only £624.

The Chairman said that apparently the company did not possess sufficient capital. Mr. Parker, one of the directors, remarked that the failure of the company had nothing whatever to do with the preparations which they put upon the market. A resolution was unanimously passed confirming the voluntary liquidation of the company with Sir H. J. de Courcy Moore as liquidator.

Midland Glass Trade

ALTHOUGH the Midland glass industry as a whole continues dull, there is much activity in that department which has relation to the manufacture of glass pressure gauges and glass boiler tubes for machinery. The export demand, particularly, is considerable, and the practice of working overtime, which has been going on for a long time, is not likely to be disturbed. The Indian and Canadian markets show vigour and Australasia's requirements are growing. There have also been large shipments to the United States and South America. As to the general glass industry, the continued increase in the imports of certain kinds of glass from the Continent is, however, causing makers anxiety. The trade in laboratory glass, which British manufacturers are able to produce satisfactorily, is badly affected by the overrunning of the market with cheap foreign products.

Oil Shale in South Africa

MR. TUDOR G. TREVOR, in an official report to the South African Government on oil-bearing shales, states that these shales are much more widely distributed in the Union than was previously thought, and that in some districts the shales are very rich in oil, though at present they are not being largely worked.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

BLUNT, W. H., AND SON, 70, Snow Hill, Birmingham, chemists. (C.C., 11/8/23.) £12 8s. 7d. June 6.

HAYNES, Herbert, 34–36, Upper Highgate Street, Birmingham, cordial manufacturer. (C.C., 11/8/23.) £22 1s. 8d. June 23.

HUTCHINSON, Mr. J. A., Holton Chemical Works, Bolton, chemical manufacturer. (C.C., 11/8/23.) £11 3s. June 20.

Bill of Sale

REID, Thomas Anderson, 4, Cecil Road, Muswell Hill, London, chemical engineer. (B.S., 11/8/23.) August 3. £100.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

CLIFF DALE BARYTES CO., LTD., Pontesbury. (M., 11/8/23.) Registered July 27, £700 debenture, to Mrs. E. Yelland, 209, Chesterton Road, Cambridge; general charge. *£700. November 20, 1922.

HEWETT AND REYNOLDS, LTD., London, N.W., dyers. (M., 11/8/23.) Registered July 26, mortgage, to bank; charged on 209, Station Road, Harrow, etc.

INDUSTRIAL SILICA, LTD., London, W.C. (M., 11/8/23.) Registered July 21, £15,000 1st debentures (secured by deed of conveyance and Trust Deed, both dated July 9, 1923); charged on property, etc., at Wadhurst, also general charge.

KLENSIT SOAP CO., LTD., Ashton-under-Lyne. (M., 11/8/23.) Registered July 28, £504 mortgage, to building society; charged on premises at Ryecroft, Ashton-under-Lyne, with machinery, etc. *£500. June 13, 1923.

REDALUMA PAINT CO., LTD., London, E.C. (M., 11/8/23.) Registered June 30, £500 mortgage, to A. H. Relf, Torry Glen, Woodford, company director; charged on premises in Clark Road, Ilford. *——. February 14, 1923.

SHANKLAND (G. A.), LTD., Eynsham, chemical manufacturers. (M., 11/8/23.) Registered July 19, £18,000 debentures; charged on properties at Eynsham, etc., also general charge. *Nil. January 12, 1923.

WHITEFIELD VELVET AND CORD DYEING CO., LTD., Middleton. (M., 11/8/23.) Registered July 27, £20,000 debentures; general charge (not including uncalled capital). *£25,920. November 14, 1922.

Satisfactions

GILBERT AND KNOWLES, LTD., London, E.C., chemical merchants. (M.S., 11/8/23.) Satisfaction registered July 30, £300, balance of amount registered September 1, 1921.

HUDSON (R. S.), LTD., Liverpool, soap makers. (M.S., 11/8/23.) Satisfaction registered July 27, £400,000, balance on amount registered July 28, 1908.

KLENSIT SOAP CO., LTD., Ashton-under-Lyne. (M.S., 11/8/23.) Satisfaction registered July 28, £500, registered February 19, 1920.

WHITEFIELD VELVET AND CORD DYEING CO., LTD., Middleton. (M.S., 11/8/23.) Satisfaction registered July 27, £20,000 registered January 18, 1902.

London Gazette

Partnership Dissolved

WORRINGHAM AND CO. (Thomas Edward WORRINGHAM and Edward WORRINGHAM), oil distillers and refiners and grease manufacturers, Blackhorse Road, Deptford, by mutual consent as from April 30th, 1923, T. E. Worringham having retired from the business. Debts received and paid by E. Worringham.

Company Winding Up Voluntarily

GERALD BROMAGE CO., LTD. (C.W.U.V., 11/8/23.) J. J. Middleton, 195, Strand, London, incorporated accountant, appointed liquidator. Meeting of creditors at Middleton and Hawkins', 195, Strand, W.C.2, on Friday, August 17th, at 12 noon.

New Companies Registered

E. CHILD AND CO., LTD., 16, Mincing Lane, London, E.C. Drysalters and general merchants; dealers in shellac waxes, gums, oils, resins, glues, colours, etc. Nominal capital, £3,000 in £1 shares.

HIBBS AND WISHART, LTD., 10, Exchange Buildings, St. Mary's Gate, Manchester. Agents, manufacturers, merchants, shippers, importers and exporters of and dealers in oils, greases, soap, candles, chemicals, etc. Nominal capital, £5,000 in £1 shares.

HYDRA LIME PRODUCTS, LTD., 25, Cross Street, Manchester. Manufacturers of lime, plasters, cement, chemicals, etc. Nominal capital, £3,000 in 2,700 ordinary shares of £1 and 6,000 deferred ordinary shares of 1s.

NATIONAL CARBONISED FUEL AND BY-PRODUCTS SYNDICATE, LTD., Fitzalan House, 13, Arundel Street, London, W.C. To carry on the business of manufacturing, producing, briquetting and selling carbonised fuel, smokeless and patent fuels and by-products; manufacturing coke and chemicals, etc. Nominal capital, £12,500 in £1 shares.

NORTH STAFFORDSHIRE SLAG AND TARMACADAM CO., LTD. Road and public works contractors, lime and stone merchants, etc. Nominal capital, £75,000 in £1 shares. A director: J. R. Lane, Leamore Lodge, Brownhills, near Walsall.

ROBERTS, ADLARD (BOURNEMOUTH), LTD., 49A, Southcote Road, Bournemouth. Dealers in stains, dyes and varnishes; oil and colourmen, chemists, druggists, drysalters, etc. Nominal capital, £5,000 in £1 shares.

Mrs. Ludwig Mond's Will

MRS. FREDA MOND, mother of Sir Alfred Mond and widow of Dr. Ludwig Mond, F.R.S., one of the founders of the firm of Brunner, Mond & Co., left £182,563. Mrs. Mond bequeathed £6,000 for educational purposes and £3,000 and an annuity of £600 (free of duty) to Miss Hulda Simons, her secretary for nearly 24 years. The annuity is to be continued to Miss Simons' sister, Alwyne, in the event of her death. Mrs. Mond also left annuities of £300 to Miss Anna Dobis, £200 to Madame Josephine Normand, and £150 to her housekeeper, Mrs. Clisby. The residue of the estate is left to Sir Alfred Mond and Dr. Robert Mond, her sons, to whom she commends the care of the graves of Mathilde Blind at East Finchley and Miss Hertz in Rome. Dr. Ludwig Mond, Sir Alfred's father, who died in 1909, left £1,422,075.